JANUARY 1956 VOL. 18, NO. 1

MINING WORLD

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Editor

How MCA Floats Rare Earths — p 43

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Associate Editor

Lithium Mining in Carolina — p 40

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District Manager

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By H. G. GRUNDSTEDT
Manager Engineering Services

Iron Ore Exports To Japan — p 66

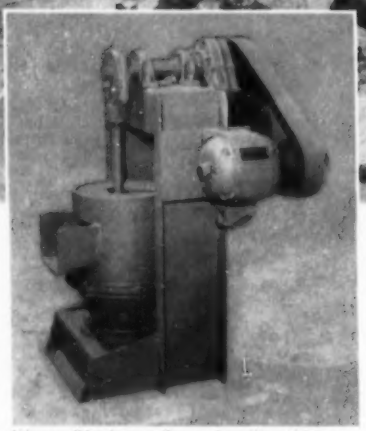
By J. M. TAYLOR
News Editor

50 cents a copy—3s 6d in sterling

Record Tonnage Produced at Navajo Uranium Division

WEMCO Equipment Resists Highly Abrasive and Corrosive Treatment

New $3,000,000 Uranium producing mill of Kerr-McGee at Shiprock, N.M. built by WKE Division of Western Machinery Company.



Wemco Diaphragm Pumps handling thickener underflow are simple to adjust and service.

The new $3,000,000 plant built for Navajo Uranium Division of Kerr-McGee Oil Industries selected equipment on the basis of resistance to highly abrasive and corrosive conditions.

This new uranium plant at Shiprock, New Mexico, utilizes an acid cure flowsheet new to uranium processing. While much of the process is highly secret, it is well known that the corrosive acid content is high and damaging to equipment. Also, the fast settling coarse sands create an abrasive action which constantly exposes new surfaces to the adverse effects of corrosion.

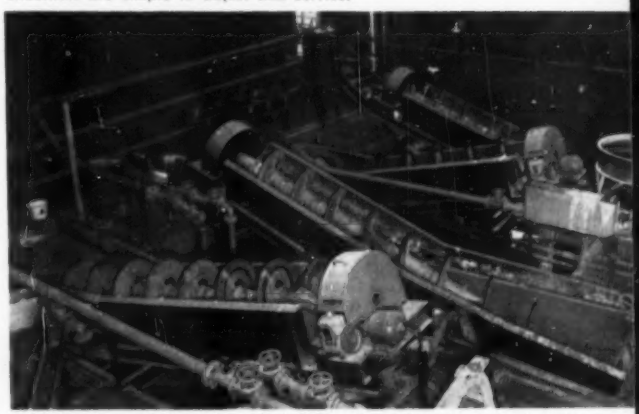
Wemco Equipment in Flowsheet

Following grinding and screening, the liberated uranium ore is processed for repulping through WEMCO rubber covered agitators producing a pulp approximately 50% solids.

From the WEMCO Agitators the pulp flows through four WEMCO Spiral Classifiers in the modified CCD system for sand-slime separation. Exposed rotating parts of the classifiers are stainless steel with the spiral flights and tanks rubber covered to resist acid and abrasion. Acid proofing of the classifiers, including the submerged bearings and spirals, has been 100% effective. Flights can be added changing the classifiers from single to double or triple pitch if additional capacity is desired.

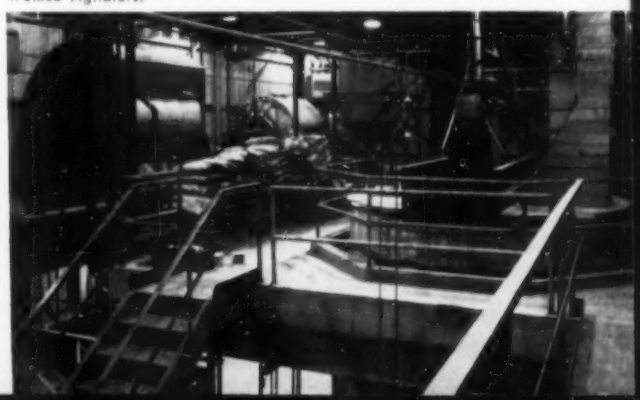
Underflow from the thickeners is handled in special acid resistant WEMCO Diaphragm Pumps. These pumps are designed for ease of maintenance and handling, with replacement of wearing parts reduced both in time and in frequency.

Precipitation of the final product utilizes specially developed WEMCO Agitators in part of the flocculating process.



Acid-abrasion resisting Wemco Spiral Classifiers eliminate approximately 60% of barren sands in the modified CCD system of Navajo Uranium.

Repulping, conditioning and part of the precipitation is handled in special Wemco Agitators.



WEMCO®
WESTERN MACHINERY COMPANY

760 Folsom Street • San Francisco 7 • California

Representatives in principal U.S. cities, in Canada and worldwide

How to pick the **RIGHT RIG** *for your job*

Alberhill Coal and Clay Company selects its equipment carefully. The firm bought two Caterpillar DW21s after comparison demonstrations with other makes in their clay pit at Alberhill, Calif. Are they glad they chose Caterpillar? Listen to Harvey Gardner, superintendent:

"We've moved as much as 3480 bank yards in a nine-hour day with these two rigs, over a half-mile round-trip haul. The material was firebrick clay—so hard that it had to be ripped." The CAT* DW21s were push-loaded by a D8 Tractor.

This DW21's performance speaks for itself. However, you can count on even bigger loads in less loading time with the new DW21 (Series C) and the new No. 470 LOWBOWL Scraper. This rig incorporates time-tested Caterpillar features with advance design improvements, packs 300 HP at 1800 r.p.m. and has a capacity of 25 cu. yd. heaped, 18 cu. yd. struck.

As a result of comparing equipment carefully, Alberhill Coal and Clay Company is now standardized on Caterpillar. The firm owns five Caterpillar track-type Tractors, a Caterpillar Motor Grader and a D13000 Diesel Electric Set in addition to the two Cat DW21s. "We've had very little down time," Superintendent Gardner says, "and we get fast and efficient service from our Caterpillar Dealer."

Get all the facts. Your Caterpillar Dealer will gladly demonstrate—on your job—the tractor-scraper combination that will move the most material for *you* at lowest cost. Give him a call today.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Swift...Sure...Safe...
Gardner-Denver GDIO Mine Car Loader

Swift... Big Dipper (4¾-cubic-foot capacity) mucks out fast . . . loads your big mine cars heaping full.

Sure... Engineered to go underground and stay. Only 2 points to oil regularly.

Safe... Low center of gravity and high flange wheels for stability on the rails. Naturally positioned controls . . . quickly and easily moved to either side. Write for additional information.

Another big capacity Gardner-Denver loader — the GD14 — loads at the rate of 2 to 3 tons per minute.

In smaller headings, Gardner-Denver GD9 loads out at the rate of 1 to 2 tons per minute.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
Expert Division: 233 Broadway, New York 7, N. Y., U.S.A.

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

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PUBLISHING OFFICE
Emmett St., Bristol, Conn.

EDITORIAL AND EXECUTIVE OFFICES
121 Second St., San Francisco 5, Calif., GArfield 1-5887

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Dist. Mgr., Chicago ..... R. N. Crosby
Assoc. Ed., Van. ..... Charles L. Shaw

BRANCH OFFICES

New York 17-370 Lexington Ave., Murray Hill 3-9295, Chicago 26—1791 Howard, Rogers Park 4-3420. Vancouver, B.C.—402 Pender St. West, MArine 7287.

PUBLISHED BY

American Trade Journals, Inc.
Wm. B. Freeman, President — L. K. Smith, Vice President
Miller Freeman, Jr., Sec.-Treas.

STAFF CORRESPONDENTS

Africa: Accra, Gold Coast; Costermansville, Belgian Congo; Johannesburg, Union of South Africa; and Kitwe, Northern Rhodesia. **Asia:** Ankara, Turkey; Benares, India; Kuala Lumpur, Federated Malay States; and Tokyo, Japan. **Europe:** Frankfurt, West Germany; Helsinki, Finland; London, England; Madrid, Spain; Vienna, Austria; Paris, France; Redruth, Cornwall; Rome, Italy; Stockholm, Sweden; The Hague, Netherlands; and Trondheim, Norway. **North and Central America:** Mexico City, Mexico; San Jose, Costa Rica; and Vancouver, British Columbia. **Oceania:** Port Kembla, (N.S.W.) Australia. **South America:** Bernal, Argentina; La Paz, Bolivia; Lima, Peru; and Sao Paulo, Brazil.

Not responsible for unsolicited manuscripts.

Mining World Subscription Rates

U. S. North, South and Central America	$3.00
Other Countries	$4.00
Single Copies	$ .50
Directory Number	$1.00

WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

MILLER FREEMAN PUBLICATIONS

GRAB SAMPLES From the Mail

36,000 Feet Too Deep

Dear Sir:

I am sorry that there are two mistakes in my article "Lead-Zinc—How Italy's Biggest Producer Plans For The Future" that appeared on pages 54 through 57 in the July MINING WORLD. Both are my fault, namely: our ore body is known to a depth of 3,000 feet, and not 30,000 as I reported. Our drills can put down 2,000 to 3,600-foot vertical holes, and not 20,000 to 36,000. I think that no drill hole has ever been put down at this depth.

P. ZUFFARDI
Minere di Montevecchio
Montevecchio, Italy

Yes, you are right. The deepest drill hole in the world (drilled for oil) was 22,316 feet deep early in December. It was being drilled ahead 40 feet per day with no announced plans to suspend drilling. The hole is the 1 LL&E Humble "L" being drilled by Richardson & Bass, and is located 35 miles southeast of New Orleans, Louisiana in the Mississippi Delta marshes. Freeport Sulphur Company has a substantial interest in the hole. The world's second deepest hole (also drilled for oil) is in Kern County, California. Its depth is 21,482 feet.—Ed.

Invaluable In Keeping Up-to-date

Dear Sir:

Please note that I, Murdoch Macivor Tulloch, a director of Allis-Chalmers Great Britain, Ltd., and manager in England for the General Machinery Division of the parent company in the United States, have recently resigned from these positions, and that I am now managing director of the Tulloch Construction Co. Ltd. at Sutton, Surrey, England.

Will you please address all correspondence to me at my new address and continue to send me MINING WORLD, as I find it invaluable in keeping me up to date with industrial developments.

M. M. TULLOCH

Appreciates World Mining

Dear Sir:

For the past years when I was assistant general manager of Societe des Mines De Zellidja in French Morrocco, I greatly appreciated the services of WORLD MINING.

I have resigned this position, but am always interested in mining and beneficiation of ores. I am now manager of the mining research branch of Bureau de Recherches Geologiques, Geophysiques, et Minieres de la France Metropolitaine which is the government organization for promoting the discovery, research and mining of metallic deposits.

I should always be very happy if you would mail WORLD MINING to the following address.

J DUFRANC
Manager of Mining Research Branch
B. R. G. G. M.
Paris, France.

MINING WORLD, January, 1956. Volume 18, No. 1. Published monthly, except April, when publication is semi-monthly at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central, and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 121 Second St., San Francisco 5, Calif.

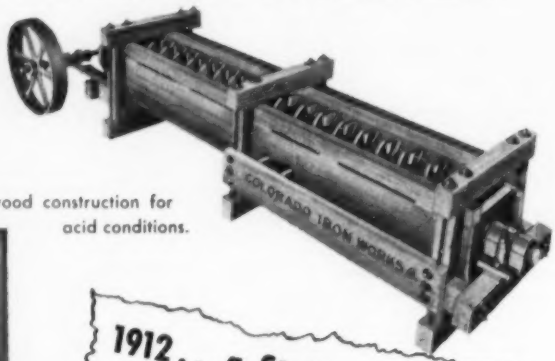
AKINS 1st in EXPERIENCE

on efficient, low-cost classification

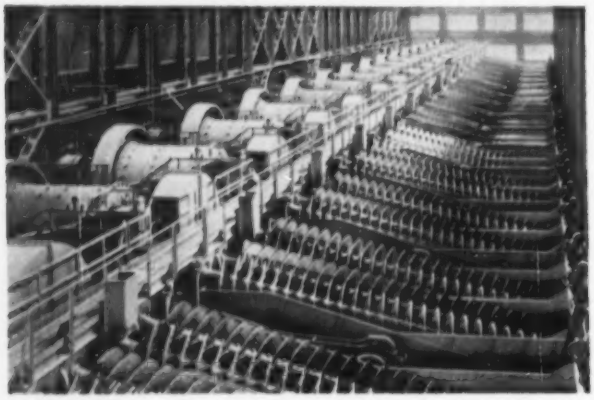
1908... the first Akins. Colorado Iron Works Company, established in 1860, specialized in making crushing, grinding, screening, cyanidation, amalgamation and smelting equipment. The Akins Classifier was developed by CIW to provide a practical, continuous system for separation of sand from slime.

The outstanding success of the Akins led to many other profitable applications and to Akins leadership in the field of classification. Today, every Akins installation on classification, sand washing, and heavy media is backed by 48 years of specialized classifier experience, 96 years experience in the mining machinery business.

1908... first Akins was for SHANNON COPPER CO., Clifton, Arizona



Photos show typical early models of the Akins, including one of wood construction for acid conditions.



1956 Photo shows part of present installation in large copper company operation... within a few miles of the same location where the first Akins was used by Shannon Copper Co. This company, since 1918, has used a total of 116 Akins Classifiers and 114 Marcy Mills in its various plants.

1912... a Statement of Policy ...Then as now

"Our aim has always been the production of a high-grade line of machinery, the prices being made as low as consistent with high quality. In no case do we attempt to build a machine to come within a certain price and place it in the field of competition with others having low first cost as their chief merit. It is this policy, consistently maintained for fifty years, that has established our enviable reputation."

(taken from CIW catalog No. 10C published in 1912)

AKINS*... *the Original Spiral Classifier*

*A Registered Trademark of C.I.W.

COLORADO IRON WORKS CO.

DENVER, COLORADO

Write for Catalog 55C

SPECIALISTS IN CLASSIFICATION FOR 48 YEARS

At Anaconda, we know firsthand the enemies of cable life: water, abrasion, excess tension, run-overs—in our own mines. This experience helps us make better cable for *your* mine use.

Get 300% longer service with Anaconda mine-tested cable

Day-in, day-out mine experience helps us make shuttle car cable that really resists enemies of cable life.

Users tell us today's Anaconda flat-twin cable lasts 3 *times longer* than the cable they used only a few years ago. What makes this Anaconda cable better?

Its jacket is specially compounded neoprene. You can't tear, cut or abrade it easily. Insulation is a new crush-resistant form of rubber, making this cable tougher and vastly more flame-resistant. And an improved stranding and a brand-new ground wire make it a lot safer to handle.

Your Distributor can give you full facts. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trade Mark

ANACONDA®
MINE CABLE

FLAT-TWIN CABLE

Improved stranding, new insulation, new grounding wire, and neoprene jacket make this a superior cable for shuttle cars, continuous miners, loaders, drill trucks, cutters.

POWER CABLES

AnacondA Types W & G are rugged, sturdy and long-lived. Used for mine power, shovels, continuous miners, loaders, drill trucks, cutters.

SHOVEL AND DRILL CABLES

Securityflex* Types W and G are used with small shovels, self-propelled drill trucks, pumps and a-c mining equipment. For higher voltages, Type SH cables (shielded) are recommended.

SECURITYFLEX CORDS

Unexcelled for strength, wear resistance and long life. Type SO (heavy-duty) provides superior service on remote control and hand drills.

- TROLLEY WIRE
- FEEDER CABLE BARE OR INSULATED
- TELEPHONE CABLE
- SHOT-FIRE CORD
- WELDING CABLE

1955 has been a year of change, consolidation and progress in both a corporate and a technical sense for Dorr-Oliver. Just a year ago we were deeply involved in the complexities of merger and, as we near the end of this first year of combined operations, a review has more than the usual significance.

Perhaps most notable has been the remarkable integration of our combined staff and its growing effectiveness in every area of operation. With this integration came important organizational change — the creation of new groups to handle technical problems more effectively and to explore new opportunities. With it also has come the strengthening of sales staff in some areas and the opening of new offices in others, designed to provide better service to our clients and customers.

Of the utmost importance in this rapidly developing picture is the welcoming of Dorr-Oliver-Long Limited as a full member of the worldwide D-O family. The natural result of a close and friendly relationship dating back to 1911, the consolidation of our Canadian operations with those of E. Long Limited of Orillia on January 1, 1956, will unquestionably strengthen our overall operations.

PULP AND PAPER — In 1955, field testing and subsequent commercial acceptance of the Webwelder for splicing corrugating medium and other heavy grades of paper was among our most significant projects. Contributing heavily to our volume of business were new or expanded Recausticizing Systems in the Pacific Northwest, Southeast, Canada, India, Sweden, Finland, Mexico and Chile. Next year the Horizontal Filter, already used for washing cotton linters, will be applied to pulp washing in a Southern mill.

INDUSTRIAL WASTES — Also in the pulp and paper industry, the largest biological kraft mill waste treatment plant in the world went into operation at West Virginia Pulp and Paper Company's Covington, Virginia, mill. And on the West Coast the most comprehensive treatment plant ever designed is now on stream handling wastes from an oil refinery. Both are D-O equipped. Orders were placed for waste treatment units to serve a midwest cannery and a large Eastern photographic equipment manufacturer.

PETROLEUM — The newly introduced D-Sander has proved to be extremely successful in removing sand from rotary drilling mud and has been widely utilized in the Gulf Coast oil fields. Fabrication of the longest petroleum filters ever constructed — six 10' x 22'3" Olivers for dewaxing — was completed at our Hazleton shops. Research and development continued on a new and unusual type of hydrocarbon purification unit, the applications of which appear almost boundless in the petroleum industry.

URANIUM — During the year a large D-O equipped Canadian uranium mill went into operation and orders were received for processing equipment to be used at six other United States and Canadian mills now under construction or being expanded. Facilities at our Westport laboratories have been enlarged to handle all types of uranium extraction work and to process small quantities of material from ore through "yellow cake". In a closely related project — the production of rare earths — D-O equipment will be widely utilized in a plant under construction.

SUGAR — As a result of three years of development we have introduced the RapiDorr Cane Juice Clarifier designed with 30% less volume than conventional units. A number of these machines will be in operation in the coming 1956 campaigns. Our associates in Italy have sold two Continuous Carbonation Systems for beet sugar processing on the Italian peninsula and mills in India will clarify cane juice in units manufactured by D-O GmbH in Wiesbaden.

SANITATION — The Densludge Process of prethickening sludge is now operating at two full-scale Biofiltration plants in the Southwest with general improvement in overall plant performance an unexpected result of its use. Tests have been virtually completed on a new Degritting Clarifier to be placed on the market in the near future. The Refuse Treator, which was developed in Holland and which may soon become an integral part of the domestic D-O line, gives the sanitary engineer another tool for the accomplishment of his ultimate goal.

RESEARCH AND DEVELOPMENT — Fundamental research has continued on the unit operations basic to D-O equipment. While such work is necessarily of a long range nature, increased fundamental knowledge has already led to marked advances in the field of clarification.

In addition to improvement of basic units, the company is constantly investigating new lines which can be profitably integrated with our other business. Current projects include an investigation to determine the manner in which D-O can make further contributions to the Atomic Energy Program and development of an ingenious Dutch device for fine screening.

COPPER — Half a world apart — in Israel and Arizona — two D-O designed copper ore dressing plants, one a full-scale operation and the other a pilot plant, are now under construction. In the United States, three large concentrators in the Southwest ordered equipment for plant expansions and in the Belgian Congo the first FluoSolids System to roast copper concentrates prior to electrolytic recovery went into operation.

FERTILIZER — Missouri Farmers Association's new plant, proving ground for the Diammonium Phosphate Process, attained design capacity in record time at Joplin, Missouri. Utilization of this new process makes commercial production of unusually high analysis fertilizer from concentrated phosphoric acid possible for the first time. In Japan, two more D-O designed fertilizer plants went into operation and a third was under construction in Norway.

WATER TREATMENT — In the field of water purification, Caracas, Venezuela and Kansas City, Missouri have duplicated orders of previous years for plant expansions and new facilities now under construction in both India and Turkey will employ extensive D-O equipment. First installations of the PeriFilter System, introduced two years ago, have shown marked economies of construction and unusual adaptability to small plants.

STARCH — Following the example of current practice in the Netherlands where the Dorr-Clone was developed, five starch processing companies in other parts of the world ordered DorrClone Systems for their operations. Starch Washing Systems — each the first of its type in the various countries — will be installed in Brazil, Canada, Scotland and the United States. A fifth producer will use TM DorrClones to recover solids from starch washing filtrate in the U. S.

FLUOSOLIDS — Most significant achievement in the field of fluidization was the successful commercial demonstration of the first FluoSolids Coal Dryer. Equally adaptable to the drying of either metallurgical or steam coal, this unit will handle material as coarse as 1½" with ease. During the year two other "firsts" were recorded — the first FluoSolids System went into operation in the Philippines and the first purchased for use in Germany. Repeat orders were received from companies in South Africa, Canada, Italy and Japan, and in the U. S. a large copper producer ordered its fourth complete System and seventh individual Reactor.

CHEMICAL — Expansion plans for alumina processing facilities in Jamaica and Germany, a potash counter-current decantation system in New Mexico, and new brine purification and pigment plants in the U. S. all incorporated substantial amounts of Dorr-Oliver equipment in their flowsheets.

Any pride we may feel in the events and accomplishments of the year is shadowed by the sudden passing of one of our Founder-Chairmen, Edwin Letts Oliver, late in the summer just past. His mechanical genius, strength and human warmth will be deeply missed by the engineering fraternity of the world. To Dorr-Oliver, and to those of us who knew him well, his loss is irreparable.

For the future, our resources are considerable. The initial enthusiasm and resourcefulness of our staff, the promise of new developments and the strength and solidarity of our Associates in Canada and abroad — all point to a steadily increasing ability to serve and an eventful year ahead.

Stamford, Conn., U.S.A.

Pit-and-Plant Housekeeping needs doing every day!

Your clean-up tasks pay no direct profits, but, if neglected, they can give you ore grading troubles, increase hauling costs, add to equipment-maintenance, and cause downtime that cuts production. One man and a modern motor-grader can do all these necessary "housekeeping" chores day-by-day . . . save expensive man-hours and production delays before the condition gets so bad it must be dealt with as an emergency involving costly repairs.

That is why we recommend the use of a modern Adams grader on a regular program of mine housekeeping. Here is a list of everyday assignments you probably include among your "housekeeping" problems:

1. **Haul-road maintenance . . .** saves tire-wear, speeds hauling, improves safety, keeps production rolling, cuts costs, increases profit.

2. **Clean-up of pit floors . . .** permits driving equipment by shortest route, saves wear on tires and crawlers, improves pit drainage, keeps dirt and refuse from weathering into lower levels of ore.

3. **Clean-up after blast . . .** the sooner scattered fragments from blast are moved back against toe, the safer for men, tires, and machines that move around your pit.

4. **Clean ore-benches of washed-down dirt . . .** the better your grade of ore, the better your price. Leaving silica and other washed-in debris on your benches invites it to wash into cracks, crevices, and drill holes in your ore. Prompt grader-service stops further "wash", piles the material for easy removal by scraper or truck.

5. **Keep concentrating-plant area clean . . .** safe to work around . . . drive around. There is occasional spill over the sides of heaped trucks, around conveyors, grizzlies, hoppers, trestles, and it pays to clean it up . . . daily. Keep roads, runways, and working areas around the plant neat, clean, and workable.

6. **Keep toes of stockpiles pushed in . . .** they contain valuable merchandise. Weather and loading operations tend to spread your stockpiles, eat up valuable workspace, waste stored material. To load from this thinly spread toe gives inferior grades, increases loading cost. A few minutes work with a motor-grader once or twice a week keeps your stockpiles clean, gives more work-room.

7. **Keep drainage open . . .** don't let puddles stand. Your pit area continually needs new drainage ditches. As old ditches fill, you need to clean them out. The best answer to ditch problems is the modern motor-grader. Watch an Adams grader work . . . you'll quickly see why a few hours a week with an Adams will keep your ditches clean and your pit dry.

8. **Level and spread on dumps . . .** means that trucks drive faster coming on . . . and faster off . . . safer, too. Adams spreads material clear over the edge with offset blade that reaches far out beyond leaning wheels that hold against side thrust. An Adams travels up to 25 mph . . . doesn't take long to get up on the dump, clean-up, and get back to the pit, working the haul-road both ways.

9. **In winter,** blade-grading of snow and ice quickly cleans pit and plant roads for safe, fast hauling. If there are drifts to lick, a V-plow attachment on your Adams grader helps open blocked roads quickly.

10. **For exploration teams,** a modern motor-grader to maintain haul-roads is a "must". Once heavy clearing is out-of-the-way, an Adams heavy-duty grader can build you a mile of well-graded-and-drained highway in a matter of hours.

It may be a good idea now to check your pit and plant housekeeping. Check, too, your available graders . . . compare them with the work-ability and versatility of a modern Adams. Perhaps it's time for a change? A new broom sweeps clean . . . a new Adams could revitalize your housekeeping program! Write for further information. And if you'd like reprints of this advertisement to use in discussing "housekeeping" with your staff, just tell us how many copies you need.

A size ADAMS for every need

Model 660—150 hp diesel engine, 27,730 lbs.
Model 550—123 hp diesel engine, 23,500 lbs.
Model 440—104 hp diesel engine, 21,500 lbs.
Model 330— 80 hp diesel engine, 20,500 lbs.

Adams optional equipment includes dozer blades, scarifier, snow plow, and snow wing.

Good haul roads speed hauling, save tire wear and truck maintenance, improve safety. Adams graders do this work fast, at low cost.

AG-6-M-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Withstands far greater

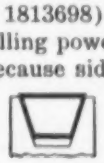
SHOCK LOADS

than any standard V-belt

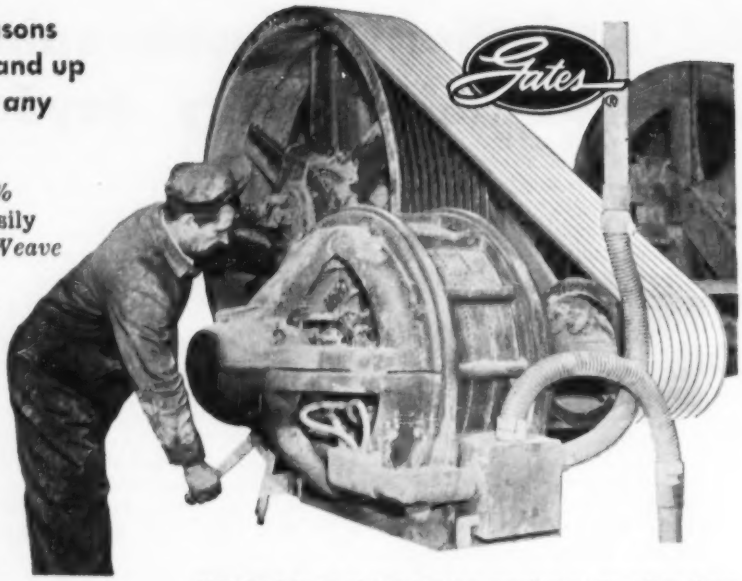
Here are the interesting reasons why Gates Super Vulco Ropes stand up months, even years longer than *any* standard V-belts...

1. *Super-Strength Cords* provide 40% greater horsepower capacity . . . easily absorb heavy shock loads. **2.** *Flex-Weave Cover* (U.S. Pat. No. 2519590) provides greater flexibility with far less stress on the fabric. Cover wears longer — increases belt life, lowers belt costs.

3. *Concave Sidewalls* (U.S. Pat. No. 1813698) provides sure pulling power, longer wear because sides straighten out as belt bends— make even contact with sheave walls.



Straight-sided belts bulge out when bent around sheave Uneven contact causes uneven wear.



SHOCK LOAD of this big jaw crusher at Canadian Quarries, Ltd. is absorbed by Gates Super Vulco Rope Drive. Wherever shock load is severe, Gates Super Vulco Ropes cushion the shock—keep machinery replacement cost down.

4 other outstanding advantages

Resists Oil, Heat and Weather: Long life is assured even in the presence of excessive oil . . . even under prolonged exposure to heat and weather.

Provides Static Safety: The high electrical conductivity of Gates Super Vulco Ropes provide safer drives in explosive atmosphere.

Has Little Stretch When Wet: Low moisture absorption eliminates need for special take-up in wet locations.

Saves Space: Higher horsepower rating and greater resiliency may permit fewer belts, or smaller sheaves where space saving is vitally important.

Gates SUPER Vulco Rope

The V-Belt with 40% more horsepower capacity

TPA 57

Pushing bladeful of sticky mud washed down by rain, Tournatractor clears rock ledge in a hurry so drill crews can go to work.

1 machine handles all tractor work at 277-acre pit & plant

To handle all the tractor jobs scattered around their 277-acre quarry and plant site in northern Illinois, a large cement company uses only 1 machine — a 186 hp Tournatractor.

In an average 8-hour day, this rubber-tired rig covers 20 to 25 miles in job-to-job travel. With a crawler-tractor, this would mean nearly half a shift would be spent lumbering along at top speeds of 5 to 7 mph just to get from one job to the next. With 19 mph Tournatractor, travel time to cover all the regular and emergency assignments around the 277 acres takes only an hour to hour-and-a-half . . . all the rest of the shift is productive work time. Tournatractor always takes shortest route between assignments . . . goes over haul roads, pavement, or cross country . . . drives over tracks without planking.

Three or four passes is all it takes for Tournatractor to clean up around stripping shovel. This is an hourly "housekeeping" job that speeds truck spotting and shovel production.

Completes 2-day track-move in 2 hours

Principal job for Tournatractor is cleaning up around stripping shovel. In spare time, the tractor also:

1. Cleans up overburden unloaded by company's 3 side-dump trucks
2. Stockpiles coal
3. Maintains trash pile
4. Handles emergency switching of railroad cars used primarily to transport the 1,500,000 barrels of cement produced here annually.
5. Builds new roads
6. Maintains existing roads
7. Prepares drill sites by cleaning dirt from rock ledges
8. Relocates track for rock trains in quarry (does in 2 hours what by hand labor used to take 2 days)
9. Handles emergency dozing around pit and plant

"Does everything but sweep out the office"

"We like the Tournatractor," says the pit foreman, "because of its work speed and because of its speed in getting from job-to-job." Adds the operator, "With Tournatractor, you can get around and do a lot of different jobs fast! It does everything around here but sweep out the office."

Get all the facts

Before you buy another set of tracks, it will pay you to investigate the high speed, lower maintenance, and greater mobility of Tournatractor. Your LeTourneau-Westinghouse Distributor will be glad to show you owner-verified reports on Tournatractor versatility and economy.

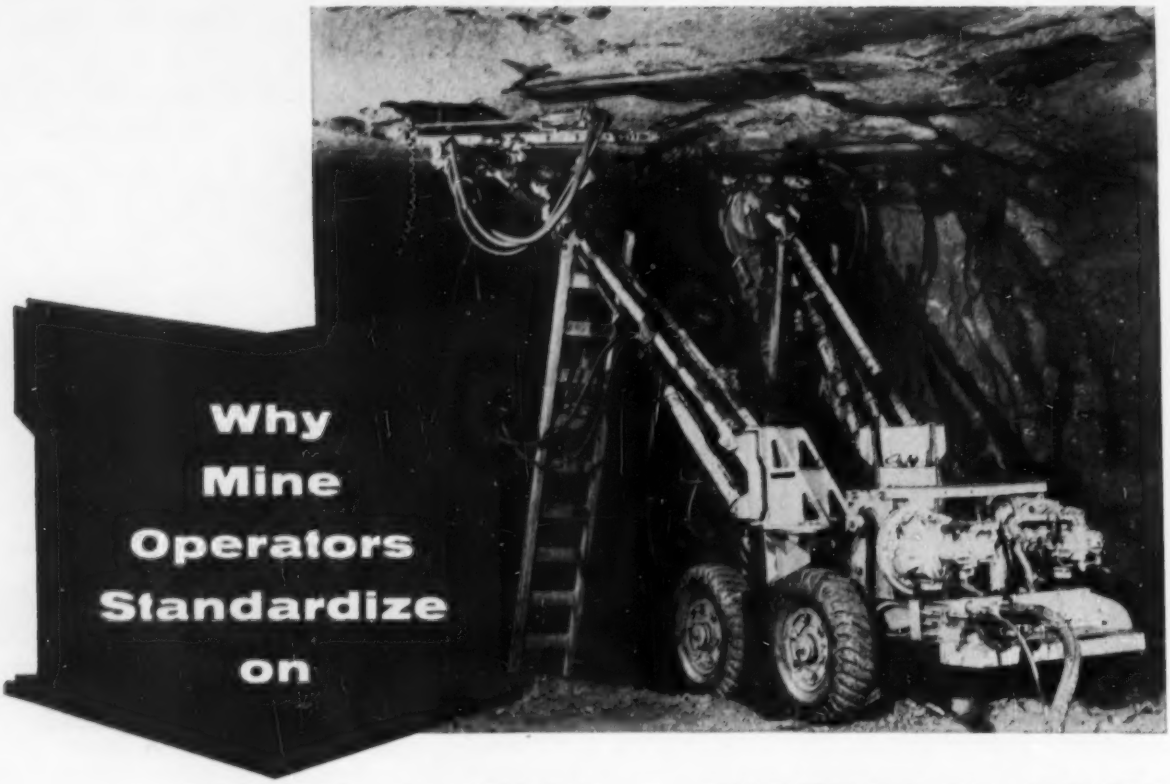
Finishing clean-up around rock shovel, Tournatractor "runs" on big rubber tires to next assignment. Its mobility, and the speed with which it completes each job, are major reasons why Tournatractor does a volume of work that otherwise takes 2 or 3 crawlers to handle.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-669-Q-bww

LeTourneau - WESTINGHOUSE Company

PEORIA ILLINOIS

A Subsidiary of Westinghouse Air Brake Company



JOY DRILLMOBILES

In 1952, an underground copper mine operator purchased two Joy rubber-tired, self-propelled Drillmobiles and two crawler-mounted jumbos of another make. Since then, this operator has standardized with the purchase of 20 additional Joy Drillmobiles. Here's why—

MOBILITY—To get high production in low-grade copper ore, this operator needed extremely mobile, highly maneuverable equipment. He got it in the fast-tramming Joy Drillmobile with tractor-type steering that makes it possible to turn around within its own length, to get into the tightest drilling locations and around short curves.

VERSATILITY—Drilling 32′ wide drifts in a highly faulted ore body, where room height at times gets down to six feet, was no problem for the Joy Drillmobile. Mounting two extensible Hydro Drill Jibs with 12′ long chain feeds, it was low enough to get into the lowest drifts and yet could drill horizontal holes at a height of 18′. The wide-spreading jibs permitted drilling the wide drifts from one set-up.

FASTER DRILLING—Air-hydraulic controls on the Joy Drillmobiles, featuring power-lift and power-swing, gave fast easy drill positioning. Drilling speed of the Joy T-350 Drifters mounted on the jibs was 16% faster than the drills on the other machines.

LOW UPKEEP COSTS—Maintenance costs for the Drillmobile including the Joy Drifters, at 1½ cents per ton, were considerably lower than the cost for the other machine and drifters.

• • •

The versatility of the Joy Drillmobile and the variety of models available makes it applicable to your mining plan. Write for more information today. • ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 21-80M

Consult a Joy Engineer

For AIR COMPRESSORS, ROCK DRILLS, CORE DRILLS, HOISTS and SLUSHERS, MINE FANS and BLOWERS

JOY

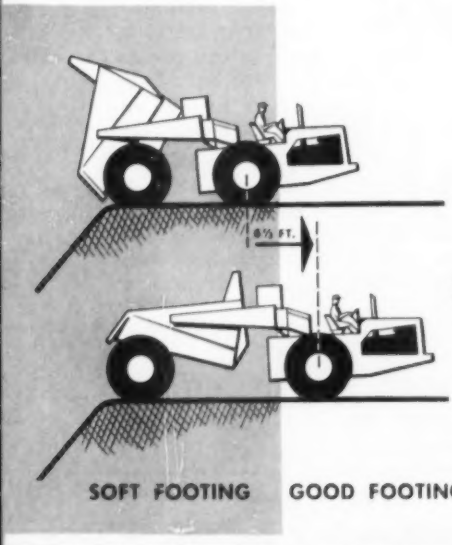
WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

W&D MS850-21

Dumps anywhere — over edge of spoil pile or into grizzly or feeder

Tournapull Rear-Dumps can haul anywhere — on or off-the-roads — to place loads exactly where you want them.

To dump over edge of spoil pile, or to plant conveyor, all you do is back close to dump point. Rig's big single tires and power steer take you over rough footing where many trucks can't go. Dump is made by flicking electric switch on control panel. This instantly activates body-hoist motor. Bowl "rocks" back easily over rear axle. You have power up and power down. Movement is under positive cable-control at all times, can be stopped at any angle. At full dump angle, bowl lip is at ground level *behind* rear wheels. This position prevents material from rolling forward under wheels. It also provides free, safe, and easy dump clear over edge of bank and greatly reduces need for dozer cleanup.



Separate braking of front and rear wheels can be used with action of hoist to help front wheels pull away from edge of soft dump. In case of trouble, rear brakes are set, front brakes released. When bowl is lowered from normal dumping position, free-rolling prime-mover wheels are pushed forward. On the "C" size Rear-Dump, they move 6½ ft. — usually enough to find good footing. If front drive wheels do not reach good footing after bowl is lowered, same "leap-frog" process can be repeated. Simply pull rear wheels forward by setting front brakes and raising bowl, then set rear brakes and push front wheels ahead by lowering bowl.

Safe at all times

In dumping, Tournapull Rear-Dumps are safer than any truck. Front-wheel-drive keeps power and traction on solid footing well ahead of rear wheels. Because body does not need to clear frame, springs, axle, or differential, its center of gravity stays low, even during dump. Oversize multi-disc air brakes — *with more braking surface on one wheel than comparable-size trucks have on all four*—prevent creeping or rolling.

Tournapull Rear-Dumps can also spread on the run. Bowl can be safely raised and lowered at normal haul speed. Operator simply positions bowl for desired flow of material and continues to drive.

There's a Tournapull Rear-Dump size to fit your needs. Write or phone for specifications and performance data on any sizes listed below:

"D"	"C"	"B"
9 TONS	22 TONS	35 TONS
138 HP	208 HP	293 HP

Prime-movers can be interchanged on scrapers, bottom-dumps, flat-beds and lift-and-carry cranes for multi-purpose operation and earnings.

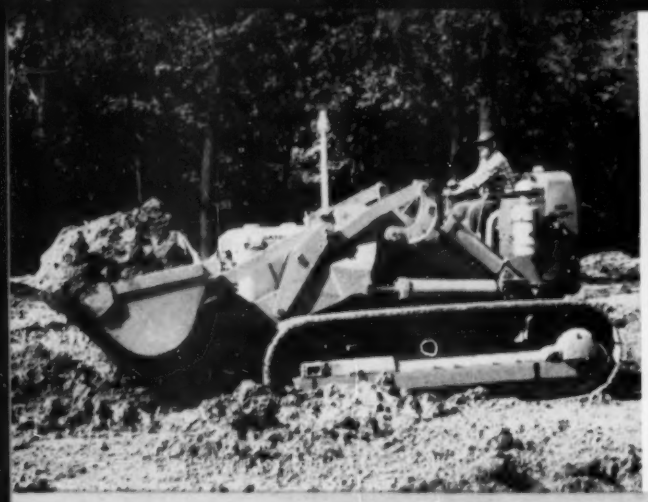
Purchases may be made in pounds sterling or United States dollars.

Tournapull—Trademark Reg. U.S. Pat. Off. R-778-G-bw

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



40° tip back at ground level to hold load.

High lift, with over 11½ ft. of dumping height.

CATERPILLAR ANNOUNCES

THE NEW NO. 977 TRAXCAVATOR*

Here's the new boss of all excavator-loaders... the new Caterpillar No. 977 Traxcavator. The No. 977 has important new features which greatly increase productivity and earning power.

Features of the No. 977 Traxcavator

- 96-in., 2¼-cu.-yd. bucket.
- 100 HP CAT* Engine, with ample power to "bury" the bucket and lift big loads.
- Bucket tips back 40° at ground level to retain heaping loads.
- More than 11½ ft. of dumping height make it easy to load any truck or railroad car.
- Steel bumpers on lift arms allow rapid jarring of bucket, and 50° discharge angle helps to empty sticky materials fast.
- Automatic kick-outs put bucket in "hold" position at maximum height and position bucket for digging on next pass. Easier operation and faster cycle times.
- Advanced hydraulic system, with pump protected by full flow filter.
- Hardened, spool-type operating valves located in large tank, protected from dirt or damage.
- Long-lived, trouble-free oil clutch of proved superiority and dependability.
- Fast, one-hand bucket operation. High seat for comfort and visibility.
- Five forward speeds to 7.4 MPH; four reverse speeds to 7 MPH.
- Each track controlled by heavy-duty dry multiple disc steering clutch and contracting band brake.
- Tools for any job: 3-yd. bucket for light material; 9-tooth quarry bucket; heavy-duty bucket; skeleton rock bucket; log and lumber fork.

Now three sizes of Traxcavators are available for all your excavating and material-handling needs. They're *unit-built* machines, so efficient that you'll find they match or excel competitive equipment with nominally greater bucket sizes. You can choose the right Traxcavator for your job from the No. 933 (1 cu. yd.)—the No. 955 (1½ cu. yd.)—or the No. 977 (2¼ cu. yd.).

Let your Caterpillar Dealer show you how these new machines can make money and *save* money for you. Get full details from him. Or mail the coupon below.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

MAIL TODAY!

CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.

Please send full information about the new No. 977 Traxcavator.

Name _____

Company _____

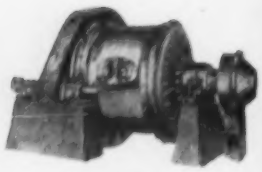
Address _____

City _____ Zone _____ State _____

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

LEADERSHIP IN ACTION



MARCY...first in EXPERIENCE on efficient, low-cost grinding

HOW RESEARCH AND EXPERIENCE CUT GRINDING COSTS

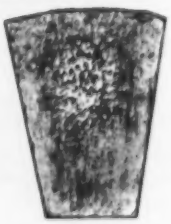
Extensive research and experimentation, since 1915, with various metals resulted in the selection of Meehanite Metal for mill heads, spur gears and bearings. Meehanite combines the desirable characteristics of iron and steel and has properties which are of particular value in mill construction. And, our foundry has developed casting techniques to take full advantage of Meehanite properties. In ball and rod mill operation the heads are stressed alternately in compression and tension, a condition produced by rotation, and aggravated by vibration caused by grinding media. Meehanite, due to its controlled structure, uniformly disseminated carbon content, and casting characteristics has the following advantages . . .

- a dampening characteristic which minimizes the effect of vibration.
- provides high fatigue resistance under alternating stresses.
- high damping capacity for vibration prevents buildup of resonant stresses in gears, assuring quiet, smooth operation.
- high strength properties with low coefficient of expansion, excellent resistance to wear, and resistance to surface breakdown, assure long wearing life.
- its strength and toughness eliminate danger of cracks in mill heads.

The outstanding service performance of Meehanite, since 1937, has proved its ability to give long, trouble-free service...and is one of many important Marcy features which reduce milling costs.

In the manufacture of any metal casting, uniform solidity and closeness of grain throughout all sections are basic essentials of dependable castings.

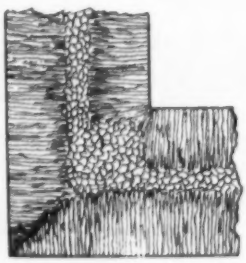
STEEL . . .
marked liquid contraction causes shrink voids, porosity and cracks.



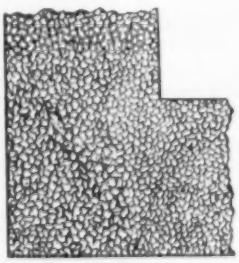
CAST IRON . . .
slight liquid expansion causes porosity and voids.

MEEHANITE METAL . . .
provides uniform solidity; permits designing and pouring castings that will have the desired strength and functional properties, free from casting strains.

All metals tend to form columnar crystallations on changing from liquid to solid state and the junction of columnar crystals is a common cause of structural weakness in steel and other alloys.



STEEL . . .
the junction of columnar crystals causes weakness in steel.



MEEHANITE
castings are substantially free from planes of internal weakness, shrinks, and columnar crystal embrittlement.

The Mine & Smelter Supply Co.

DENVER • SALT LAKE CITY • EL PASO • NEW YORK

Representatives in Foreign Countries

WRITE FOR NEW MARCY MILL CATALOG

SPECIALISTS IN GRINDING FOR 40 YEARS

CAL-WIC INDUSTRIAL SCREENS

Today, as never before, Cal-Wic Industrial Screens are being used in the expanding construction industry of America. Contractors know they can depend on Cal-Wic Screens because they are tailor-made for accurate sizing and long life, resulting in less downtime and greater production.

Every phase of production of CF&I Cal-Wic Industrial Screens is checked by exacting quality controls to assure that highest standards are maintained. The steel used is specially-selected, basic open hearth steel which has the right balance between hardness and toughness. Cal-Wic Industrial Screens are then woven on powerful looms. They have tight wire intersections and openings that will retain their original size.

There's a CF&I sales engineer always within easy reach . . . ready to give you prompt assistance with any operating problem that might arise. For complete details, contact our nearest District Sales Office.

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THE COLORADO FUEL AND IRON CORPORATION
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Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles
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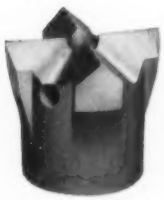
No time-wasting drill steel changes with TIMKEN® interchangeable rock bits!

Dozens of different Timken® multi-use and carbide insert bits fit the same drill steel

TIMKEN® multi-use and carbide insert bits eliminate the time wasted in going after a different set of steels whenever a different bit type or size is needed. Timken rock bits are interchangeable. Dozens of different bits fit the same drill steel. It takes only a minute to unscrew one type of Timken rock bit and screw a different type bit on the same drill steel. And you don't have to carry a large drill steel inventory.

With Timken rock bits, your men can quickly switch to the most economical bit as the ground changes—right on the job. Both Timken carbide insert and multi-use bits are made from electric furnace Timken fine alloy steel. Both have special shoulder unions that keep drilling impact from damaging threads.

Our rock bit engineers are experts at cutting drilling costs. They'll be glad to help you. Drop them a line. There's no obligation. Write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small diameter holes, very deep holes.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

your best bet for the best bit...for every job

for LESS COST *per* TON BROKEN

and MORE FEET *per* SHIFT DRILLED

. . . power your drills with
SELENIUM-NEOPRENE ARMORED
SIMPLEX-TIREX CABLE!

Sunlight won't crack TIREX Cable.

Samples of TIREX Selenium-Neoprene Armor exposed to continuous sunlight for 20 years show no signs of cracking.

TIREX Cable is not bothered by rain, snow and moisture.

TIREX has worked under water in mines for years without trouble.

Curing in lead makes TIREX Selenium-Neoprene Armor tough, hard and extremely resistant to abrasion.

TIREX Cable has been crushed under falling rock and accidentally run over by loaded trucks. It still works dependably.

TIREX is unusually flexible even in below freezing temperatures. It resists acids, oil and flame.

Write today for more details about Simplex-TIREX Cable with Selenium-Neoprene Armor to the address below.

ONLY **Simplex** MAKES

SELENIUM NEOPRENE ARMORED **TIREX**

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

J. L. McCune & H. E. Sadler, underground maintenance foremen, Pacific Coast Borax Co., Boron, California

"Red Line 350 Oil...life blood of these machines"

"Union's Red Line 350 Oil performs so well in the hydraulic systems of our Joy continuous miners and shuttle buggies that we hardly ever think about it except to keep the levels up.

"In the four years that we've been using Red Line 350 we've never had it 'boil over' or fail in any other way despite extremely heavy work loads and ever-present dust. Because the operation is entirely dependent upon properly functioning hydraulic mechanisms you might say that Red Line 350 Oil is the life blood of these machines."

The job that Red Line 350 Oil is doing in the Joy machines at Boron is typical of the service that Union Oil lubricants give in mining machinery above and below ground. If you need help with any specialized problem of mining machinery lubrication, you can get that help through your nearby Union Oil representative.

UNION OIL COMPANY
OF CALIFORNIA

76

Los Angeles: Union Oil Bldg. • New York: 45 Rockefeller Plaza • Chicago: 1612 Bankers Bldg. • New Orleans: 644 National Bank of Commerce Bldg. Atlanta: 401 Atlanta National Bldg. • Kansas City, Mo.: 612 W. 47th St.

CALL ON STANDARD

A ten-foot diameter *Standard* kiln is pictured above, ready to be shipped to its Louisiana destination. Lower photo shows kiln shell mounted on flat cars. Another car carries the enclosing furnace, trunnions and running gear.

Although by no means the largest kiln to be completed by *Standard*, it is a good example of our ability to design and build rotary processing equipment of any size—LARGE or SMALL.

In this, our 50th Anniversary Year, we take pride in the fact that for precision engineering and fabrication of heavy duty machinery, the call is so often for *Standard*.

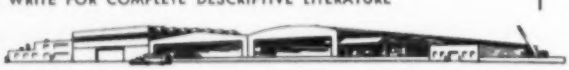
Rotary KILNS

COOLERS
CALCINERS
DRYERS

ANY size
ANYwhere

STANDARD

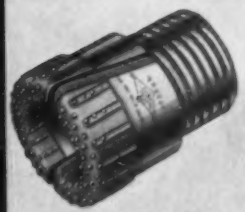
WRITE FOR COMPLETE DESCRIPTIVE LITERATURE



STANDARD 50 YEARS 1899 1949 STEEL CORPORATION

STANDARD STEEL CORPORATION

5031 Boyle Avenue, Los Angeles 58 • 15 Park Row, New York 31



TRUCO CORING BIT

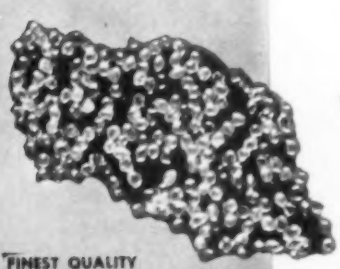
TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT



FINEST QUALITY DRILL BORTZ

in the American tradition

Twice a day a quick transformation overtook the old frame garage on John R Street, Detroit. At seven in the morning, the doors swung open, a spindly car chugged out and the garage became a busy little workshop. Some time after dark, the car was driven back in and, for a few hours, the workshop was a garage again.

As a workshop, it had for us a very special significance—it was here that our Company came into being and set up the first local shop devoted exclusively to making industrial diamond tools.

But, far more important, it was the first place in the whole midwest where industry could find a complete stock of fine industrial diamonds, imported direct to Detroit, and superior to stocks previously available only in New York.

Such convenience is taken for granted nowadays and the mails deliver thousands of our diamond selections yearly, but, in those days, it was an innovation and so useful that in almost no time at all, the old frame garage (which had cost $50.00) needed a 12-foot addition (which cost another $50.00).

And, that was but the beginning. Today, our plants are the most modern in the industry and in the intervening 46 years our laboratories have pioneered many of the most significant innovations in diamond tool technology, including *Engineered Diamond Tools** and Truco Engineered Diamond Bits.

And, today, in every major drilling operation throughout the world, Truco Engineered Diamond Bits enjoy a unique reputation for fast, accurate, dependable cutting in any formation and for their ability to deliver important economies in rig time and footage costs. May we send you the Truco Diamond Bit Catalog?

**Engineered Diamond Tools* are diamond tools *engineered* to the job and *guaranteed* to do it.

TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

NEWEST PAYLOADER® MODEL sets the pace for a bomber base

Here is the starting point of Peter Kiewit Sons "production line" for concrete placing at a large bomber base — a Hough model HH "PAYLOADER" tractor-shovel feeding a belt conveyor with sand and gravel from adjoining stockpiles. The task of the "PAYLOADER" is a crucial one, because failure at this point would bring the entire concrete-placing operation to a standstill.

Peter Kiewit Sons, one of the largest and most progressive of heavy contractors, have been using "PAYLOADER" tractor-shovels for years on their contracts all over the United States. You too, can depend on the proven performance of "PAYLOADER" tractor-shovels and on the large and reliable Distributor organization that sells and services them, both at home and abroad.

This model HH is one of three completely-new 4-wheel-drive "PAYLOADER" tractor-shovels. They all have a sensational new kind of bucket arm design that provides 40 degrees of bucket tip-back at ground level, powerful pry-out action plus unusual safety, stability and visibility factors.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
859 Sunnyside Ave., Libertyville, Ill.

Send data on new 4-wheel drive units

- ☐ Model HU—1 cu. yd.
- ☐ Model HH—1½ cu. yd.
- ☐ Model HO—2 cu. yd.

☐ Smaller "PAYLOADER" units

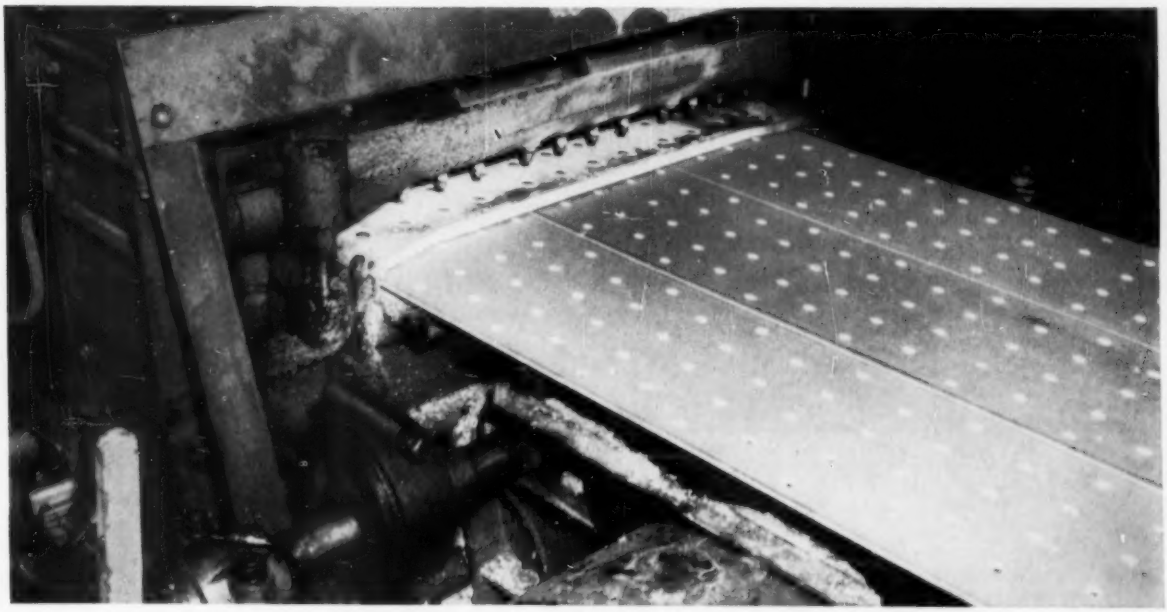
Name_____
Title_____
Company_____
Street_____
City_____
State_____

The Engineer's Field Report

CASE HISTORY
LUBRICANT Calol Gear Compound

FIRM Blue Diamond Corp., Blue Diamond, Nevada

Wet punch works 5½ years without gear loss despite extreme pressures and shock loads



BLUE DIAMOND CORPORATION, a leading Western gypsum producer, has rolled gypsum lath through this Ehrsam wet punch press 24 hours a day for 5½ years without a gear loss. Shock loads on this 500-pound punch exert extreme pressure on gear teeth, yet Calol Gear Compound keeps them in perfect condition. Even under these severe load conditions the lubricant protects teeth surfaces against galling and scuffing. Calol Gear Compound is available in eight grades to meet specifications of various gear manufacturers.

FREE CATALOG: "How To Save Money On Equipment Operation," will be sent on request to Standard Oil Company of California, 225 Bush St., San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF.

Why CALOL GEAR COMPOUND protects enclosed gears

Tough film protects gear teeth against scuffing and scoring under severe shock — load conditions

Highly adhesive... clings to gear teeth and bearings, even under the wettest operating conditions

Oiliness additive reduces friction

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

Mack diesel dumper used to haul crushed stone and agricultural limestone from the quarry of the Waukesha Lime & Stone Co., Inc., Waukesha, Wis. In operation since 1905, this quarry is presently producing at a rate of 500,000 tons per year.

Macks make your other equipment investments pay off

For a work-speeding, profit-making combination, team up your big shovels with Mack trucks.

Macks keep shovels on the go because they make fast hauls between mine or quarry and unloading site. They can be depended upon to meet schedules because Macks don't bog down or break down when the going gets tough. They handle the heaviest loads under the toughest conditions. They require minimum maintenance and provide maximum fuel economy.

Whether you utilize trucks for removing overburden . . . for hauling ore from open pit mines . . . or in quarrying operations—putting Macks on the job will pay off because they make possible the most profitable use of machinery and manpower. Investigate Mack trucks today. Contact your nearby Mack representative.

MACK TRUCKS Empire State Building, New York 1, N. Y. 3603

620 lbs. lighter, more portable, and more durable...

Welded Assembly of USS "T-1" Steel Cuts Grapples Weight 47%

It isn't the logs that wear out log grapples like these. But dropping the grapples 10, 25, or 30 feet, twice a minute, hour after hour, day after day, does wear them out. They literally destroy themselves. That's why light weight is important. And toughness. And strength.

Mack Welding Company, Duluth, Minnesota, has cut weight of grapples 620 lbs. and simultaneously *increased* durability, just by switching from mild steel to rugged USS "T-1" Steel. Here is what they say about "T-1":

"We thought we had reached the lowest possible weight when we manufactured a previous model weighing 1300 pounds. But these new grapples made from your 'T-1' Steel weigh only 680 pounds—just a little over half as much. That's an important advantage for loggers who have relatively small-capacity truck-mounted cranes. No other rolled steel plate would give us such light weight in grapples capable of handling up to 3 ton loads."

"T-1" WELDS BEAUTIFULLY!

"As far as fabrication is concerned, we find that 'T-1' Steel welds beautifully and can be flame cut in exactly the same way as mild steel, without distortion or any other difficulty. We're very pleased with it."

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You can use "T-1" to reduce weight . . . to lengthen service life . . . to reduce costs. Look around you. You'll find a job for it—a job that no other steel can do so well. United States Steel, Room 5134, Pittsburgh 30, Pa.

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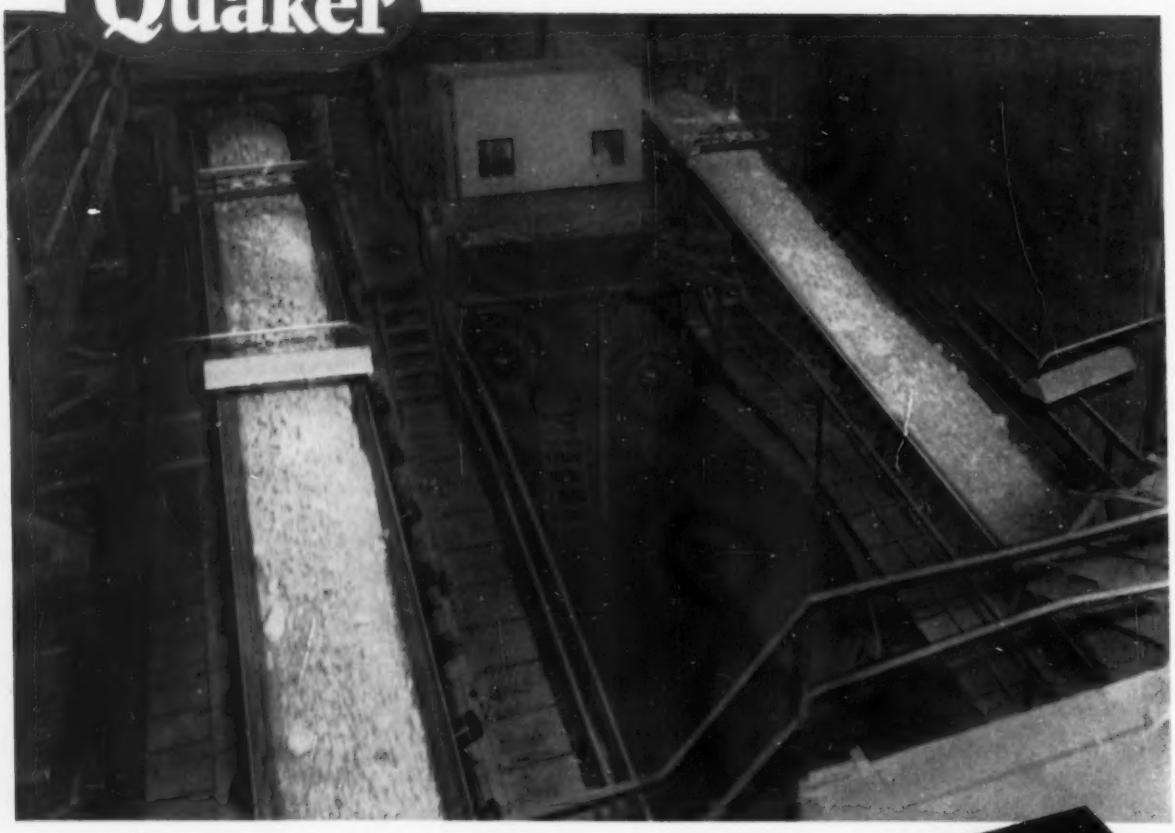

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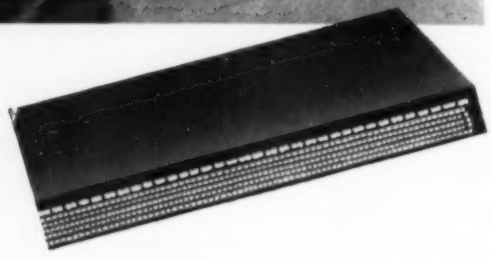

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Drifts and Crosscuts

Are Metals Underpriced?

You can always count on the Colorado Mining Association to come up with an outstanding program which probes directly into the heart of the mining industry. This year's program is no exception and one of the most outstanding and far-reaching sessions will be that dealing with the cost of producing lead, zinc, and other metals.

When the price of Prime Western zinc was raised from 13.00 to 13.50 cents on October 17, 1955 there was an immediate and loud protest from the American Die Casting Institute that the price increase was "Unwarranted" and that it resulted in ". . . impairment of confidence resulting from unsettled market".

There is no question but that zinc is faced with strong and growing competition in use for die casting from both aluminum and magnesium. Fortunately, zinc has many superior physical properties for such use and its greatly accelerating demand for die casting purposes has been a very important thing for the zinc miners. Zinc has and will continue to meet the threat of such competition. At any rate so strong was the cry from the Die Casting Institute that the price of zinc was cut back to 13.00 cents on October 19th.

It was immediately pointed out by Otto Herres, chairman of the National Lead and Zinc Committee, that the price of industrial raw materials was up "some 12.5 percent, the price of aluminum has advanced 2.2 cents per pound, and copper 13 cents" since October 1954. In contrast the combined price advances of lead and zinc amounted to only 2.0 cents per pound, or 7 percent, he added.

Mr. Herres also pointed out that the small increases in the prices for lead and zinc had been wiped out "by another round of wage increases and rising prices of supplies".

In other words the cost of production increases faster than the selling cost.

It is interesting to note that the recent price increases, from $6.00 to $8.00 per ton, for steel have brought no similar complaint from any Steel Users Institute.

The Western Governor's Mineral Policy Conference held in Sacramento, California last November brought out this important fact concerning cost of raw materials in consumers' items. "It seems important at this point to emphasize the relatively small portion of the consumer's dollar which is actually paid for the materials of the mines when the final product is considered. Thus, in the average automobile, approximately $40.00 worth of iron ore is utilized; only $1.50 worth of manganese is consumed; and less than $50.00 of the non-ferrous and alloy metals go to make up the material from which that automobile is produced."

People are still buying cars despite the recent 3 to 6 percent in sales prices. There has been acceptance of this price rise in view of added manufacturing costs largely brought about by Guaranteed Annual Wage.

There can be no underestimation of the importance of an adequate price for minerals—especially in that competition of uses between metals prevents "pricing out of the market."

The Colorado Convention proposes to prove that costs of mining justify higher metal prices.

U and You

You are in the mining business in some form or another as a regular reader of MINING WORLD. Everyone in the mining world has been and is interested in uranium. This interest has spread to the oil companies and has been reported in detail in the Fission Facts page.

The following letter from an experienced uranium miner now operating a split check lease in the heart of the Colorado Plateau will be of interest to You.

"I am interested in obtaining a lease or farm-out on some vanadium or uranium properties."

Oil has brought its term "farm-out" (to turn over by contract to others) to the mining industry.

Of great interest to You is the fact that there is growing pressure for small miners, lessees, and, for that matter, oil men and firms to seek places to mine U.

Is the big oil money (and large mining companies) forcing the small operator out of U?

Mercury Mystery Deepens

In the October 1954 issue of MINING WORLD the "Drifts and Crosscuts" section asked the question "Who's Got The Mercury". The obvious answer was that the United States government had the mercury. It still has, although there has been no recent evidence of large-scale government purchases. But why and for what purposes was the government buying such great quantities of mercury? At that time the best guess seemed to be that it was going into the atomic energy program—possibly as a coolant or heat exchanger.

The recent Geneva, Switzerland Atoms-For-Peace-Conference has only intensified the mystery! Close checking of abstracts of papers presented at the Conference mention many metals, liquid metals, and alloys playing important parts in peaceful civilian atomic energy. These include: uranium, thorium, zirconium, hafnium, cadmium, beryllium, tin, gold, bismuth, sodium, posassium, aluminum, lead, stainless steel, iron, nickel, and chromium. Where is mercury?

Does this mean that mercury is a component in the military uses of the Atom? Does it mean that at one time mercury appeared to have important uses —so important that it was necessary to corner the world's stocks—only to have subsequent developments show mercury is not needed? Or is the government's interest in mercury for guided missiles, or some ultra top secret weapon?

Geneva didn't clear up the mystery of mercury. If anything, it deepened the question of why the government holds all its mercury.

"100% SATISFIED" with his GOLD MINE'S CAT* POWER

UP IN the hills north of Trona, Calif., near the legendary "lost" Peg Leg mine, are the gold mine and mill of Argus Development Company. Two Caterpillar Electric Sets and a Caterpillar Engine supply all power for them. According to Russell A. Donnelly, Argus' president, "We're 100% satisfied with these units. We like their easy starting in cold weather, and their economy, dependability and quick pickup in power."

A Caterpillar D13000 Electric Set furnishes power for crushers, conveyors and lights at the mill, which has a capacity of 100 tons of ore per eight-hour shift. Another Cat Electric Set powers the hoist at the mine. There is also a Caterpillar Engine, veteran of more than 7000 hours, in a Gardner-Denver compressor. Ore is trucked 8½ miles from the mine to the mill.

Excellent as these units are, the new Cat Electric Sets are even better. They are self-regulated sets, giving precise control of voltages from no-load to full load, and simplified operation without adjustments. The new Caterpillar Electric Sets produce greater power from more compact units . . . for easy installation or change of location. They are available in a complete range of sizes up to 300 KW for permanent installations or as portable power plants.

Find out for yourself why Russell Donnelly says, "We bought Caterpillar because it's tried and proven. We like the performance and the dealer service." Call your Caterpillar Dealer today for full information on the electric set that best suits your needs. And count on your dealer for fast, skilled service and parts you can trust.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co

MODERN HEAVY-DUTY ELECTRIC SETS

Capitol Concentrates

Must Make New Approach To Solution Of Domestic Mine Production Problems

Since the veto of the strategic minerals purchase bill H. R. 6373, discussion around the country and in Washington has centered on the need for a new approach to the problem.

Delegates to the Western Governors Mineral Policies Conference, recently held in Sacramento, California, however, failed to come up with anything new. The favorite panacea proposed was, of course, greatly increased tariffs. No matter how desirable higher tariffs may be, we must realize that the principle is unacceptable under United States foreign policy and efforts in this direction are probably wasted. The next most-discussed plan was the application of import quotas along the line of the formula the domestic fluorspar producers have been advocating. The chances of putting a series of import quotas into effect are very slim indeed, in spite of the favorable attitude of the Office of Defense Mobilization toward oil import quotas.

An old idea which has been revived is to give domestic producers a subsidy in the form of a cut of custom duties collected on imports. Any attempt to put such a plan into effect would produce nothing but wails of anguish from the Treasury Department and prompt disapproval from the Administration. A bill to protect the mercury industry in this manner was introduced some years ago and never got out of committee. About the only practical idea left is across-the-board or differential producer-subsidies which the domestic mining industry in general does not like.

One plan that has not had general discussion is a mandatory Buy-American Act for metals and minerals which would not leave it to the discretion of the President to reduce the Buy-American percentage margin to the vanishing point—as has been done under the present so-called By-American Act. Certainly, if the domestic mining industry is to have protection, a different line of thinking must be pursued than has been followed for the last several years. Perhaps this is the answer.

• Mining Law Administrator Is Named

Allen F. Miller, supervisor of the Stanislaus National Forest, with headquarters in Sonora, California, has been promoted to the position of assistant to the chief of recreation and lands in the chief forester's office, Washington, D. C. In this assignment in the Washington headquarters of the Forest Service, Miller will direct the application and implementation of the new mining law (Public Law 167) as it applies to lands within the national forests.

Public Law 167, signed by President Eisenhower on July 23, 1955, relates to the multiple use of the surface of new mining claims filed on the public domain. It seeks to limit the use of the surface of mining claims to bona fide mining purposes and to prevent the filing of mining claims to gain control of or title to valuable timber or grazing land and water.

• Buy-American Differential Is Increased

In an effort to swing business to distressed labor areas, the Interior Department has announced it will award future contracts to foreign firms only when they underbid United States companies in surplus labor areas by 12 percent or more. It is believed that the Defense Department and General Services Administration, which do most of the business with foreign firms, will follow the lead of Interior.

The Buy-American Act had been whittled down, step by step, until the permitted differential was only 6 percent. The new total of 12 percent is still inadequate to keep the business in the United States in most cases.

• Help Is Only Theoretical

The Office of Defense Mobilization is up to its old tricks! A directive to General Services Administration for purchasing additional quantities of certain strategic minerals, including antimony, has caused some people to think that domestic mining might be helped. Although the directive gives theoretical preference to domestic production, purchases must be made "at the market," and what chance has the domestic producer to do business with the government on these terms?

• OMM Reports Are Minus Quantity

When the House Interior Committee's subcommittee on mines and mining interrogated Office of Defense Mobilization Director Flemming on the activities of the Office of Minerals Mobilization the Congressmen learned officially what they had already suspected—that ODM had received no complete studies from OMM on any mineral. This, however, contradicts a speech made in New York a few months ago by a high Interior Department official who listed studies already made. All of which leaves the public almost as confused as is OMM.

• Action on Pending Applications Suspended

According to Assistant Secretary of the Interior Wesley A. D'Ewart, the Bureau of Land Management has suspended action on pending applications for hard-rock minerals prospecting permits on acquired lands when the area exceeds 10,240 acres. This will permit a study of testimony and briefs presented at a public hearing November 10 on departmental regulations which became effective August 17, 1955, governing prospecting and leasing of hard-rock minerals in acquired lands.

Those appearing at the hearing urged a substantial increase in the 10,240-acre restriction on the aggregate holdings of one permittee or lessee for one mineral in any one state under permit and lease combined. They also petitioned for removal of the retroactive application of the limitation to applications filed prior to August 17.

No decision will be made on the request to broaden the acreage restriction, D'Ewart said, until thorough consideration has been given to the briefs and oral statements.

• Stockpile Figures May Be Made Public

Sentiment is growing stronger and stronger for removing the cloak of secrecy from national stockpile figures. Congress never intended these figures to be classified, as may be seen by reading the Stockpile Act of 1946. Nevertheless, principally no doubt to cover up mistakes and manipulations, this information has been kept top secret. It is gratifying to know that a governmental committee is now studying the matter with the idea of recommending de-classification of at least part of the figures.

• Treatment Plant Is Advocated

Legislation will be introduced at the next session of Congress to authorize establishment of a treatment plant for stockpiled manganese ores, according to plans of Representative John J. Rhodes of Arizona. The type of plant Rhodes is advocating would be a full-scale operation based on one of the methods which the Bureau of Mines and research engineers have been studying for several years. It would be located near one of the government's stockpiling depots and would convert the low-grade ores into marketable-grade manganese. Rhodes explained that investigations by the House Interior Committee's subcommittee on minerals had convinced him that such a processing plant is feasible.

"The government has a big investment in these low-grade domestic ores," Rhodes said. "That's why I feel it is wise to build a plant that can convert these ores (averaging about 20 percent manganese) into usable material."

Rhodes explained that his bill will give the U. S. Bureau of Mines the authority to select the treatment method to be employed.

The government's purchase depot at Wenden, Arizona, was closed last May when its quota of 6,000,000 long ton units of recoverable manganese was attained. The Deming, New Mexico, depot reached its quota and was closed November 30, 1955. Still receiving ores is the depot at Butte, Montana.

COMING CONVENTIONS

January 16, 17, 18, 1956. Annual meeting MINNESOTA SECTION AIME and the University of Minnesota MINING SYMPOSIUM, Hotel Duluth, Duluth, Minnesota.

February 2, 3, and 4, 1956. NATIONAL WESTERN MINING CONFERENCE, sponsored by the Colorado Mining Association and affiliated groups. Shirley Savoy Hotel, Denver, Colorado.

February 20 through 23rd, 1956. Annual Meeting AMERICAN INSTITUTE MINING and METALLURGICAL ENGINEERS, New York, New York. Headquarters hotel, Statler; banquet hotel, Waldorf-Astoria.

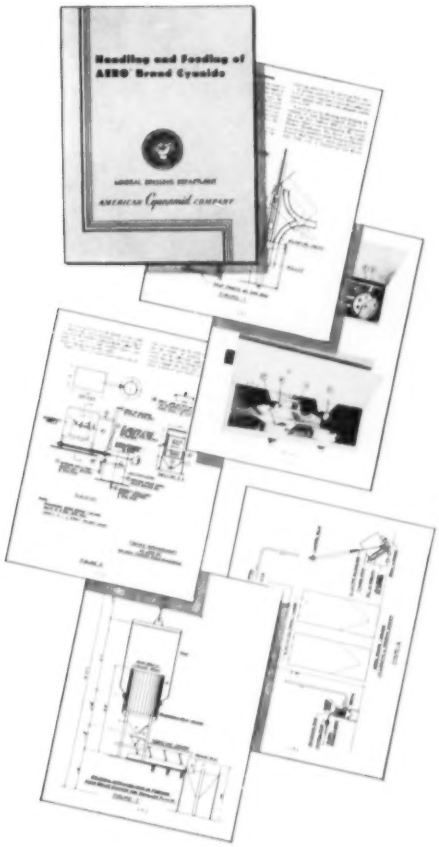
March 18 through 24, 1956. Joint meeting of the AMERICAN MINING CONGRESS ON SURVEYING and MAPPING and the AMERICAN SOCIETY OF PHOTOGRAMMETRY, Shoreham Hotel, Washington, D. C.

April 23 through 25, 1956. Colorado School of Mines SYMPOSIUM ON ROCK MECHANICS, Golden, Colorado.

Cyanamid REAGENT NEWS

"ore-dressing ideas you can use"

Have You Received Your Copy of "Mineral Dressing Notes" No. 22



The latest issue of "Mineral Dressing Notes" was published during 1955 and is entitled "Handling and Feeding of AERO® Brand Cyanide". If you have not yet received this valuable bulletin, may we suggest that you drop us a note requesting one or use the handy coupon below.

Sections in this valuable primer on the feeding of AERO Brand Cyanide include notes on the properties of this widely used product, transportation, storage, safety precautions, and a description of the various feeding arrangements used at a number of cyanidation operations.

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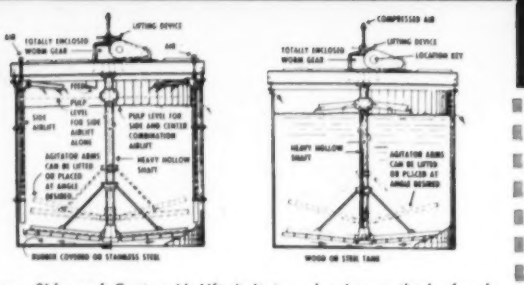
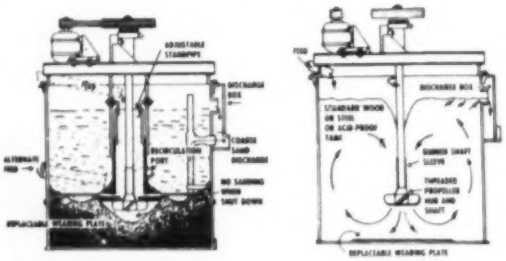
ALSO—There are 24 No. 30 (56 x 56) and 112 No. 24 (43 x 43) DENVER "Sub-A" Flotation Cells at Lynn Lake Concentrator producing nickel and copper concentrates.



Denver Side and Center Air-Lift Agitators showing method of pulp recirculation. Note many features that give trouble-free operation.



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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

January 1956

INTERNATIONAL PANORAMA

MONTICELLO, UTAH—The largest uranium transaction in history, sale of the Happy Jack mine at White Canyon, Utah has been concluded for an estimated $30,000,000. The Fletcher-Bronson interests who owned the mine sold an option to National Mining and Milling Corporation.

MONTPELIER, IDAHO—The Potash Company of America is developing an underground phosphate mine in Paris Canyon. Phosphate means diversification for this major fertilizer (potash) producer.

JAMSHEDPUR, INDIA—The Tata Iron and Steel Company Limited has signed a contract with the Kaiser Engineers division of Henry J. Kaiser Company for erecting a complete steel mill from ore to finished product.

GREEN RIVER, UTAH—A Patino Mines and Enterprises Consolidated associate—United Prospectors, Ltd.—has shipped its first uranium ore from the Snow Lease. Surface drilling and underground development are planned.

BORON, CALIFORNIA—Isbell Construction Company has started preliminary work in preparation for stripping $10,000,000 tons of overburden at what will be the world's first open pit borax mine here. Pacific Coast Borax Company awarded Isbell the contract.

HAVANA, CUBA—Jauregui mines has made the first shipment of Cuban iron to West German steel mills. The mines are in Oriente Province.

SAN FRANCISCO, CALIFORNIA—Kaiser Aluminum & Chemical Corporation will increase its aluminum production capacity by 220,000 annual tons, and its alumina capacity by 500,000 annual tons at a cost of $280,000,000.

TENNANTS CREEK, AUSTRALIA—Peko Gold Mines, N. L. will build a copper smelter at its copper mine here at a cost of £A1,000,000. Blister production is expected within three years.

MOAB, UTAH—Hidden Splendor Mining Company has purchased control of Almar Minerals, Inc. for $8,0000,000 cash. Almar has reported indicated reserves of 600,000 tons of 0.5 percent U_3O_8 ore at its mine in the Big Indian district.

GLOBE, ARIZONA—Inspiration Consolidated Copper Company is spending $5,000,000 to modernize and enlarge its copper concentrator here. It will treat 16,000 tons of ore daily when completed in December 1956.

DULUTH, MINNESOTA—Shipments of iron ore by Great Lakes steamers in 1955 reached an all time peace year high of just under 87,500,000 gross tons. Record shipments were 95,844,499 tons in 1953.

SALT LAKE CITY, UTAH—Kennecott Copper Corporation's Utah Copper Division which operates the world's largest copper mine in 1955 mined and milled 27,800,000 tons of ore from which 468,200,000 pounds of copper and 24,987,000 pounds of molybdenite were recovered.

BIRD SPRINGS PASS, CALIFORNIA—The United States Atomic Energy Commission is diamond drilling for uranium on the Lucky Seven partnership claims. A prospect shaft is planned.

KELLOGG, IDAHO—Bunker Hill & Sullivan Mining and Concentrating Company is expanding its electrolytic zinc plant to 7,200 tons monthly capacity. Present plant produces about 4,800 tons of slab zinc per month.

CLIMAX, COLORADO—Preliminary reports indicate that the production of molybdenite concentrate in the United States in 1955 reached an all-time high for a peace-time year at over 60,000,000 pounds.

MANILA, PHILIPPINE ISLANDS—Marinduque Iron Mines Agents, Inc. has announced plans to erect a 3,000 to 4,000-ton per day copper flotation mill at its Sipalay property in Negros Occidental.

WASHINGTON, D. C.—The United States Atomic Energy Commission will ask private industry to supply up to 100,000 pounds of pure beryllium metal per year. Present cost of beryllium metal is $104.00 per pound.

ILO, PERU—Foley Brothers of Pleasanton, New York has been awarded the contract for the construction of a major port here to serve as the ocean port for the new Southern Peru Copper Corporation.
stop Kuehl

Governor's Council Makes Final Recommendations

The final report and recommendations of the Western Governors Mineral Policies Conference and the Western Governors Mining Advisory Council have been completed in the form of a "Proposed National Minerals Policy."

The December 1955 issue of MINING WORLD, page 67, reported on the Policies Conference and preliminary thinking of both groups in regard to tariffs. The final recommendations differed with the preliminary report for the following minerals: ANTIMONY, ore and concentrates not less than 15 cents per pound of contained antimony, and not less than 30 cents on smelter products; CHROMITE, 5 cents per pound on contained metal; MERCURY, a tariff at the same percentage of the selling price today as the present tariff which was established in 1922; MOLYBDENUM, no comment on tariffs; RARE EARTHS, a tariff of 10 cents per pound on contained rare earths.

The report concluded with a summary of possible solutions considered in developing the recommendations and was presented by S. H. Williston, chairman of the Council.

New Gold Mine in Belgian Congo Has Large Reserves

A hydroelectric power plant and crushing plant have been completed at the site of the important, rich gold mine in Maniema, eastern Belgian Congo, discovered shortly after the end of World War II. Both plants have had trial runs and should be in full operation shortly.

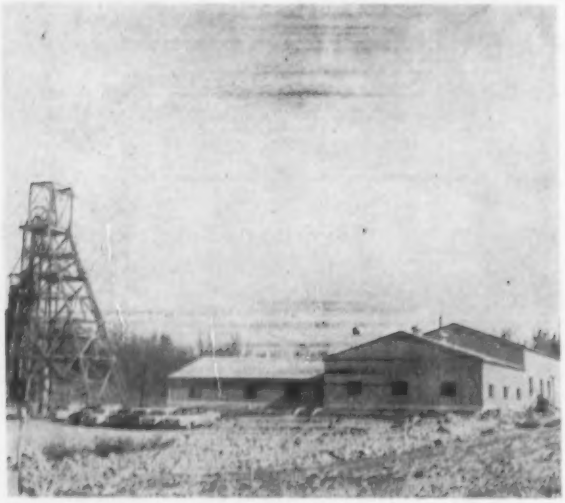
This mine is the property of Kinoretain, a subsidiary of Somikin. It is located halfway between the Lualaba (Upper Congo River) and the northern end of Lake Tanganyika, on about the Fourth Parallel south of the Equator. Gold mining has long been important in the northeastern Belgian Congo, but this new mine has been developed from a relatively recent discovery. Development since has confirmed the importance of the gold reserves.

Inspiration Lets Contract For Concentrator Work

A $5,000,000 contract for complete rehabilitation of Inspiration Consolidated Copper Company's concentrator at Inspiration, Arizona has been awarded to Western Knapp Engineering Company, a division of Western Machinery Company. Work is to be completed by the end of the year.

The new concentrator will have a total capacity of 16,000 tons of ore per day and will consist of seven ball mills. Inspiration will then have a dual process for copper recovery, for leaching will be followed by flotation, permitting greater ore recovery.

Underground Mines of the Year . . . .



UNITED STATES UNDERGROUND mine is the Young mine of American Zinc Company of Tennessee. First ore was mined in July at the mine east of Mascot, Tennessee.

FOREIGN UNDERGROUND MINE is Pronto Uranium Mines, Ltd. in the Algoma district of Ontario. Output will be 2,500 tons daily hoisted through the vertical 500-foot-deep shaft.

Industry Review: Mining in 1955

That fateful time of year has arrived. First to recount the accomplishments of the old year, secondly and most difficultly to forecast the mysterious future of the new year. MINING WORLD's Editor, GEORGE O. ARGALL, JR., undertakes to do both.

Earlier Predictions Form Basis For Others

In looking back at 1953 the uranium discovery in the Gas Hills district of central Wyoming was listed as important. That and other newer discoveries in the same region are still in the news, and a forecast for a uranium mill to serve these districts is given below in more detailed form.

The *Metallurgical Development of 1953*, the Burwell filter, continues in the news with ever growing applications, and more are to come, with the new larger units.

Things To Watch in 1954 included the Mascot-Jefferson City zinc district of Tennessee. Since then the Young mine of American Zinc Company of Tennessee has been developed and placed in production. Also, New Jersey Zinc Company is developing the new Flat Gap mine at nearby Treadwell, Tennessee.

Also to be watched in 1954 was the Grants-Laguna area of New Mexico. You all know what has happened there. The Anaconda Company has developed the famous Jackpile and North Jackpile ore bodies and is mining them by open pitting. The Jackpile was one of main reasons for MINING WORLD's selection of Anaconda as the Mining Company of 1954.

In Idaho the 1953 prediction was for "Tremendous expansion of phosphate mining and elemental phosphorus production. . . ." These really happened in 1955. The J. R. Simplot Company is developing the Centennial mine in northern Idaho. Mining will be by open pitting initially, but ultimately it will become one of the nation's largest underground phosphate mines. In southern Idaho the Central Farmers Fertilizer Company started an open-pit mine, prospected underground, and announced plans to build a $7,500,000 electric furnace plant to make elemental phosphorus. In addition Potash Company of America is developing an underground mine and plans experimental equipment development and mining methods.

MINING WORLD underestimated when it predicted two new deep shafts for uranium ore in the Big Indian district of San Juan, County, Utah in 1955. Actually there were two deep shafts completed, one nearly so, and a fourth started. Completed were the Radon shaft of Hecla Mining Company for Federal Uranium Corporation, and the Far West shaft of Almar Minerals, Inc. Now being sunk is the 600 foot, 3-compartment shaft of E. L. Cord and Associates. In November 1955, work was started on a 2,500-foot inclined shaft to reach the low-grade North Alice ore body of Homestake Mining Company.

The large-scale development at Pima Mining Company south of Tuscon, Arizona has become a reality with Utah Construction Company rushing waste stripping and construction of a 3,000 ton per day flotation mill which is scheduled for completion in the fourth quarter of 1956.

The following prediction was denied, laughed at, and ridiculed by many: "While not in 1955, but sooner than you think, a broad gauge railroad locomotive fueled with uranium and hauling uranium to market over the same rails that the very same uranium locomotive fuel was hauled in 1954 and 1955, too." Very frankly, this was coming as close as possible to telling you one year ago that the company

UNITED STATES OPEN-PIT mine is the Tioga No. 2 of the Western Mining Company (Pickands Mather & Co., managers). This iron ore mine is west of Grand Rapids, Minnesota.

FOREIGN OPEN-PIT mine is the Toledo mine of Atlas Consolidated Mining and Development Corporation on Cebu Island in the Philippines. First ore was mined in February.

And a Forecast of 1956 Trends

indicated was the Denver and Rio Grande Western Railroad Company, which serves Grand Junction, Colorado, a major collection point for uranium concentrates by the United States Atomic Energy Commission.

How things changed in 1955! In mid-year the AEC announced that it had signed a research and development contract with the Rio Grande and Baldwin-Lima-Hamilton Corporation "to study the technical, engineering, and economic feasibility of using nuclear powered engines to haul trains." In July the Rio Grande became the first railroad to employ a nuclear scientist to study an atom powered locomotive.

With these predictions proving right it gives a sounder basis for looking into 1956. Turn the page and see what's ahead this year remembering this is written early in December of 1955. Time will tell how good the picks have been. If more are good than bad it will be a success. That's the best we can hope for.

These Were Big Events In Mining In 1955

Thus does history repeat itself. But here are the most significant happenings in 1955.

Copper was the *Metal of 1955.* World-wide demand, plus a loss in production caused by strikes, shot the price to 43.00 cents Connecticut Valley on September 1st, with grey markets and European prices going as high as 50.00 cents. This wasn't the highest price per pound in history as copper sold at 55.00 cents during the Civil War. The 43.00 cent price is the highest since 1872 when it was one cent higher. At year's end copper was such a scarce metal that some of our friends made their Christmas gift choices jewelry and objects d'art made of copper. They proved both pretty and practical, as well as proving the donor was not parsimonous.

The *Geologic Discovery of 1955*—good possibility of a major Butte open pit—was actually made earlier as a result of many years of geologic work by the Anaconda Company. However, it was not announced until June 30th by Chester H. Steele, vice president in charge of western operations. He said that members of the geologic department ". . . found indications of a secondary enriched layer which it was thought might be suitable for open-pit mining . . . . it was decided to churn drill the area for complete sampling . . . . an area measuring approximately 2,000 feet by 3,600 feet has been outlined. . ."

As almost everyone foresaw, the *United States Discovery of 1955* would be in uranium, as it was in 1954. The discovery was in Alaska, on Prince of Wales Island, to be exact. In May, husband and wife, Don and Jan Ross, made an airborne radiometric discovery. They landed, found the radioactive area on the ground, staked claims, and interested Climax Molybdenum Company in exploration and development.

The *Domestic Open Pit Mine of the Year* was the Tioga No. 2 of the Western Mining Company (Pickands Mather & Co., managers), west of Grand Rapids, Minnesota. This is the first Mesabi Range iron ore mine west of the Mississippi River and was placed in production despite bad physical conditions. It is bordered on two sides by lakes, overburden was fine sand and a little mud through which determination fought to get the mine into production. Continental Uranium Company's Rattlesnake open pit near La Sal, Utah can't escape notice. No ore was produced in 1955

but with a planned stripping ratio of waste to ore of 35 to one, it certainly will make mining history.

The *Foreign Open Pit mine of 1955* is that of Atlas Consolidated Mining and Development Corporation on Cebu Island in the Philippines. This, because Atlas is the pace setter in working low-grade copper in the Orient on a large scale with modern United States equipment. Gunnar Mines Ltd's open pit in the Beaverlodge district of northern Saskatchewan must be included in this summary of foreign pits. It has been called the highest grade major open-pit mine in the world. Drilling indicated $38.00 per ton uranium ore for a length of 1,400 feet and a width of 600.

Underground Mine of 1955 was the Young mine of American Zinc Company of Tennessee, at South Friends Station Tennessee. First ore was mined in July. The mine is completely mechanized for low-cost operation.

Abroad the Underground Mine was that of Pronto Uranium Mines Ltd. in the Blind River, Ontario district. Open stopes with slushing on the flat dipping footwall will be used. The mine is laid out for long wall retreating as panels are mined progressively from the ends of the deposit to the shaft pillar.

The *United States Mill of 1955* is the E. W. Davis Works of Reserve Mining Company at Silver Bay, Minnesota. This is the first commercial taconite plant in the United States with first ore milled in October.

Foreign Mill of the Year was Gaspe Copper Mines Limited's copper flotation plant in Quebec, Canada. The first unit started April 7th. Failure of the power line has delayed 6,500 ton capacity operation. This new mine, mill, and smelter are scheduled to produce 35,000 tons of copper annually. Another mill of note which reached full capacity in 1955 is that of Uruwira Minerals, Ltd. at Mukwamba, Tanganyika. At this mill 50 percent of feed is discarded by HMS and the resultant bulk concentrate separated by flotation into a lead and a copper concentrate.

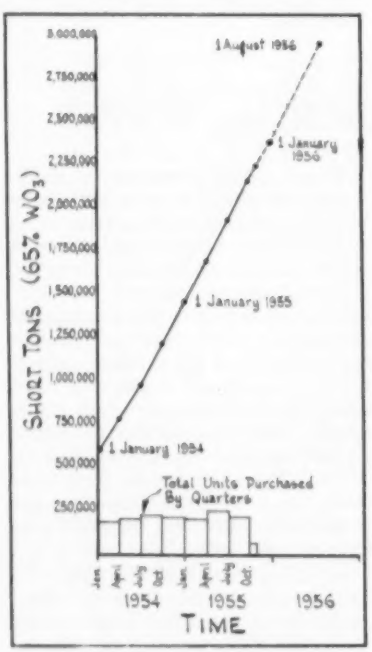
Significant *Mining Developments of 1955* included use of Akremite (and similar powders) for blasting of overburden and ore in open pits from Michigan to New Mexico. Akremite was originally developed by the coal industry, but found growing favor in metal mines as the year progressed. The new Ingersoll-Rand Drillmaster blast hole drill is the latest attempt to tailor the method and type of drill to the rock. The trend continued toward concreting permanent mine openings and any openings through which several hundreds of thousands of tons of ore must be drawn.

The most important *Milling Development of 1955* was the end of secrecy on uranium metallurgy by the United States Atomic Energy Commission on August 10th. MINING WORLD, through the cooperation of the AEC, had the opportunity to be the first technical magazine (September, page 83) to give full details of the four methods of extracting uranium from solutions and slurries.

The most important *Development in Extractive Metallurgy* was the announcement by International Nickel Company of Canada, Ltd. of its successful development and use of flash smelting of concentrate.

Exploration Drilling saw the return to greater use of diamond drilling by many operators on the Colorado Plateau. Their conclusion was that you just can't beat a core. On the Plateau for holes under 400 feet deep, the trend in percussion drilling, was to bigger drills, bigger holes, bigger steel and bits, and bigger volumes of air at higher pressures. Junction Bit and Tool Company developed a self-contained, self-propelled unit using 1⅛-inch steel with extra large air hole for three-inch-diameter prospect holes with a four-inch Gardner Denver machine.

The Prospectors Discovery of 1955 in the United States was for lead-silver, not uranium, believe it or not. This was at the Diamond Jim mine in northern Nevada. Good prospecting, coupled with determination by James C. Trisoliere, found the faulted section of a high grade vein which had been given up as impossible to locate. Mr. Trisoliere and his two partners soon sold a 55 percent interest to the United States Smelting, Refining and Mining Company.



The Prospectors Discovery Outside the United States was in central Samar in the Philippine Islands. Prospectors seeking iron ore for Marinduque Iron Mines, Agents, Inc. found secondarily enriched high-grade copper ore. Exploration has since proven copper ore, iron ore, and an iron-copper ore.

The *Record of Accomplishment in Mining* can be said simply: "South Africans Do It Again—Set New World's Shaft Sinking Record." In 1953, record accomplishment was sinking of 585 feet in one month at Vlakfontein Gold Mining Company, Ltd. in 1954, it was 597 feet at Merriespruitt Orange Free State Gold Mining Company Ltd., and for 1955, it was 763 feet at West Rand Consolidated Mines Ltd.

Not surprising is the claim behind the Iron Curtain for a new world record for heading advance in one month. It was set in 1954, but only broke through the curtain in 1955. Here is the claim, but remember that everything has been claimed by the Soviet world from invention of the airplane to the submarine, and many things between. At any rate 2,856 feet of 9.5-by 11.8-foot crosscut was driven through hard shale. The back was lagged with posts used for support. Maximum footage in one day was 106.0, with highest number of rounds, 11.5.

Once again MINING WORLD presented the *Mining Article of 1955*. It was "Philippine Mining: Today and Tomorrow" in the special September issue.

Greatest Surprise of 1955 was the strength of the copper market. Also the sudden fear for the future of uranium following the Atoms For Peace Conference at Geneva, Switzerland despite a guaranteed market and price in the United States until March 31, 1962.

Disappointment of 1955 was President Eisenhower's veto on August 14th of H. R. 6373 which would have continued the domestic minerals purchase program. The Department of the Interior and the Bureau of the Budget endorsed the bill, but it was successfully opposed by director Flemming of the Office of Defense Mobilization.

The *Exploration Equipment Trend* of the year was to transistorizing of geophysical instruments. Gieger counters and magnetometers were

prime examples. The Varian Associates' nuclear precession magnetometer which was the *Exploration Tool of 1954* was rebuilt with transistors and printed circuits to a weight of only 25 pounds and small enough in size for easy back-packing.

Without question the *Domestic Mining Companies of 1955* were the American Zinc, Lead and Smelting Company (and subsidiaries), and Continental Uranium Company—American Zinc, for its dynamic expansion program in Wisconsin and Tennessee. In the later state since August 1954 the company ". . . has indicated a tonnage equal to all the other ores we have currently proven in all of our other Tennessee operations." Continental for pioneering large-scale high-ratio waste stripping for Salt Wash (Morrison) uranium ores, and for successfully working out a new uranium-vanadium flowsheet and securing AEC approval and a contract for mill construction.

The *Foreign Mining Company* was Atlas Consolidated Mining and Development Corporation for bringing into production the Orient's largest open pit copper mine on Cebu Island in the Philippines. Other important foreign mining companies were the Hartebeestfontein Gold Mining Company, Ltd. which poured its first gold bullion only 2¾ years after mine development started. This entailed sinking two shafts, 3,041 and 3,297 feet deep, and developing an underground mine for a production of 50,000 tons per month. The mill construction started in August 1954 with first ore milled in May of last year.

Men of the Year in Mining (in the United States) were: Floyd Odlum for his faith in uranium and its growth potential. He backed his faith with cash, too, and by year's end estimates of his uranium holdings by Atlas Corporation and other controlled companies on the Colorado Plateau, in Australia, and Canada were as high as $37,000,000. Dr. E. W. Davis, the world's foremost taconist, who saw his work and visions of more than 40 years come true at Reserve Mining Company's Silver Bay taconite plant which will produce 3,750,000 tons of pellets annually. Fletcher and Grant Bronson, and Joe Cooper deserve inclusion in this important category. They took a prospect they bought for $1,000 and developed it into one of the nation's largest and highest grade mines before selling it so as to effect minimum taxation through capital gains.

The *Foreign Men of the Year in Mining* logically includes Col. Andres Soriano for his vision, determination, and financial acumen in bringing Atlas

Continued on page 77

What You Can Expect In 1956

The most wanted things in 1956 in uranium are an extension of the AEC domestic buying program and an improvement in the AEC purchasing of high lime ores.

Watch the consolidation of uranium companies to continue on the Colorado Plateau.

You will see the oil companies, and this includes major producers, increasing their interest in mining. The trend started in uranium and will continue in 1956. In addition, the oil companies' interest in phosphate, potash, and sulphur, to name only a few minerals, will grow.

The mine to watch in the Coeur d'Alenes is the Galena Unit of American Smelting and Refining Company. Already a large silverlead producer, the ore seems to get better, the deeper the mining goes.

Don't be surprised if copper, lead, zinc, and pyrite make news in northern California in 1956. Important production in the Bully Hill district awaits favorable markets, and open pitting for pyrite-chalcopyrite is the trend.

Definitely under consideration, but perhaps happening later than 1956, is inclined skip hoisting in several western copper pits. Hoisting will be patterned after installations on the Mesabi Range at the South Agnew, Morton, and Whiteside mines.

Watch for more open pitting of uranium ores including the small, irregular, and scattered deposits of the Salt Wash formation. After viewing Continental Uranium Company's Rattlesnake pit, old time vanadium-uranium miners invariably wonder how much ore they missed in backs, floors, and walls of their "gopher hole" type underground workings.

The government's purchase of tungsten concentrates is predicted to be completed by early August. See graph of recent purchases and their projection. Price will then drop, probably to a $40 to $45 per short ton unit.

Another thing to watch for is increased mining for other purposes than the extraction of minerals. First to come about—and it has only started—is the mining of underground openings for hydrocarbon storage. With 7,000,000 to 8,000,000 new cars per year the cities are just plain running out of room to put them. A logical place to go is down—underground—and that will take some form of mining.

Mining of uranium is the start of the atomic cycle. Mining is destined to play an ever increasing part at the end of the cycle; that is, mining to develop a suitable, safe, cheap, and permanent "garbage can" for reactor ashes and other highly radioactive, exceedingly dangerous end products from atom burn-up. Where is there any better place for these reactor wastes than back underground, covered by several hundreds of feet of solid rock?

Specific forecasts are for domestic mine production of copper to reach 1,000,000 short tons in 1956. This will be the greatest production since 1944. This prediction is based on the belief that labor peace will prevail with no major strikes. San Manuel Copper Company will add appreciably to output this year, and Pima Mining Company will make some production.

The iron ore mining industry will be "as good or better" than in 1955. Taconite production will, of course, reach an all time high.

Selenium, nickel, copper, aluminum, platinum, titanium, vanadium, phosphate, boron, and silver will all enjoy good market demand this year. Zinc consumption will remain high, but very adequate world supplies will prevent any major price changes. Potash supply will be adequate for all markets.

More uranium will be mined and milled in every producing country in the world than ever before. In the United States, alone, 14 mills varying in capacity from 100 to about 2,000 tons per day will be in operation. Utah, with four mills, will treat about 35 percent of the daily tonnage; Colorado with six mills, 31 percent; New Mexico with two, 29 percent; Arizona with one, 2.7 percent; and South Dakota's one mill, 2.3 percent. Projected new mills, of course, will treat additional tonnages.

Increased production of ilmenite in New York is forecast.

In Butte, there is the prospect of a new big deep main shaft to serve the western group of mines.

The metal to prospect for in 1956 is selenium. It remains one of the most critical metals in the government's stockpiling program and is in very short supply despite record high prices. In fact, a pound of 99.5 percent selenium metal is worth as much, or more, than a pound of high grade uranium concentrate.

Copper output will reach an all-time peak in the Philippines this year. Look for an important copper discovery on Luzon where a major mine may be developed.

INDIAN CREEK MINE is a scene of busy mining activity with simultaneous waste stripping, drilling ore, and loading and hauling ore out of pit area. Benches will be established around ore perimeter and advanced to center.

Lithium Corporation

MURPHY-HOUSER MINE has been developed along a major pegmatite dike. The waste overburden was stripped for 1,800 feet along the dike strike before mining started at the highest point on the eastern end. Picture was taken looking east.

Opens Two New Mines

By A. E. ROBERTS

New York District Manager

This is Part I of a two-part article on Lithium Corporation of America, Inc's. spodumene mining and chemical plant operations in North Carolina. For Part II, describing the new $7,000,000 lithium carbonate plant near Bessemer City, read the February issue of MINING WORLD.

As part of the expansion project designed to greatly increase production of lithium and its compounds, Lithium Corporation of America, Inc. recently completed its new $7,000,000 plant near Bessemer City, North Carolina. Lithium Corporation's holdings in this area, acquired since World War II, are believed to be one of the largest single reserves of spodumene ore in the world.

Before going into the operation of the mines and chemical plant, let's review the past and present picture of lithium for a better understanding of its importance. Lithium was a sleeper for almost 125 years. However, since World War II, it has undergone a rapid industrial transformation. This is readily evidenced by a quick look at the production statistics for the past 20 years.

In 1935 lithium production in the United States (expressed in terms of Li_2O was about 50 short tons. The production rate increased slowly until the war years, when production hit 850 tons during 1944. (Lithium hydride was used as a source of hydrogen to inflate antennae balloons for the Gibson Girl emergency radio transmitter.) By 1947 production had dwindled to 200 tons. Then the lithium industry began to grow. Production in 1950 was over 700 tons (about 1,000 tons as Li_2CO_3). And last year, U. S. production was estimated at 1,500 tons (3,500 tons as Li_2CO_3)—more than double the war-time high.

What's behind this rapid growth of a metal that was discovered in 1817 and was commercially dormant for so long a period? Today, compounds of lithium are utilized by a multitude of industries, thanks to modern research programs devoted to improving methods of extraction and finding new and better ways that lithium can serve industry.

The major proportion of commercial lithium is consumed by two fields. Lithium hydroxide is widely used in the manufacture of multi-purpose greases having extremely wide temperature ranges. The porcelain enamel industry uses lithium carbonate to make lithium-containing enamels, and its use is on the increase. Estimations

have been made that either of these two industries may, in a few years, require more lithium than is currently being produced. Other phases of the ceramic industry are potential users of lithium in volume.

Lithium Has Many Uses

Lithium and its compounds are used in varying quantities by many other industries. Lithium metal has been used for years as a degasifier, deoxidizer, desulfurizer, and general purifying agent in metallurgy. A small amount of metallic lithium, when added to a charge of molten copper, removes the dissolved gases and oxides to further enhance the electrical conductivity of the copper, and at the same time provides a more uniform casting. Metallic lithium also has possibilities as a minor component in aluminum, magnesium, zinc, copper, and lead alloys.

One of the more important and fastest growing uses for lithium metal is in the field of organic synthesis. One current commercial application is in the production of synthetic Vitamin A. Over 20,000 pounds of metal is consumed here annually. Some of the newer drugs now in pilot-plant stage employ lithium metal in their production.

Lithium bromide and lithium chloride find wide usage in air conditioning brines for dehumidifying the air. Lithium chloride is also used in the manufacture of welding and brazing fluxes for aluminum and magnesium.

Other products which contain lithium include: phonograph records, optical lenses, electrolyte additions to alkaline batteries, refrigeration systems, signal flares, fireworks, and printing inks. Even the picture tube in TV sets has this versatile element represented.

A possible future potential for lithium rests in the hands of the scientists who are working to apply the fusion reaction of the H-bomb for the generation of low-cost power. In such fusion reactions lies the tremendous energy which may be harnessed for future power generation.

Occurs Only In Mineral Form

Lithium belongs to the alkali group, occurring only in mineral form. There are many minerals that contain lithium, and it has been estimated that the earth's crust is 0.002 to 0.007 percent lithium. There are, however, only four minerals that are found in sufficient concentration for commercial exploitation. Of the four—spodumene, lepidolite, petalite, and amblygonite—spodumene is the more abundant and economically feasible.

Metallic lithium is soft, and has a silver-white color. It is very active chemically and tarnishes readily when exposed to the atmosphere. Like sodium and potassium, the pure metal must be kept under kerosene, mineral oil, inert cases, or special airtight containers. It is the lightest of metals (sp. gr. 0.53) and weighs only 33 pounds per cubic foot.

Tin-Spodumene Belt

Spodumene occurs in North Carolina in pegmatite dikes along a section locally known as the "tin-spodumene belt." This belt is about 25 miles long and 2 miles wide, extending from Lincolnton, North Carolina to Grover, South Carolina. The region is underlain by interlayered hornblende-biotite gneiss and muscovite schist and gneiss, crystalline limestone, quartzite and granite.

Spodumene-bearing dikes are mostly tabular in form and are of unknown depth. Laterally they vary from 1,800 feet to less than 100 feet. Width of dikes vary from narrow stringers to 50 feet or more in width, and coalescent dikes may form a mineable continuous ore body hundreds of feet in width. Dikes generally follow the structure of the country rock, striking northeast.

Lithium Corporation is presently mining several properties. Two of these in the North Carolina area are

DRILLING ORE BENCHES at the Murphy-Houser mine with a self-propelled tractor-jumbo mounting 4-inch Cleveland drifters on air-controlled jibs. Holes are drilled to a depth of 24 feet. Air is supplied by a portable Ingersoll-Rand compressor.

MURPHY-HOUSER ORE is loaded into 6-ton Koehring Dumptors by Caterpillar D6 front end loaders. Ore is hauled to a stockpile. The hanging wall of the ore dike is sloped and benched to prevent caving. Open pitting will be to a depth of about 80 feet.

THAT'S A SPODUMENE CRYSTAL that Dan Michalek, senior geologist for Lithium Corporation's North Carolina mines, is pointing at with his pencil. C. H. Robinson, engineer, holds the piece of high-grade ore.

the Murphy-Houser and the Indian Creek. However, it owns or has leased many other properties in the tin-spodumene belt and has outlined considerable reserves by diamond drilling.

The Murphy-Houser deposit is located on the Little Beaver Dam Creek area, near Crouse, Gaston County, North Carolina and consists of a parallel series of dikes. The major dike of this deposit, one of the longest in the area, is 1,800 feet long. Width varies between 28 and 23 feet. It strikes N. 20° to 30° E.

Mining the Dikes

Initially, clay overburden is stripped to bedrock on both sides of the dike for its entire length. Depth to bedrock is between 15 and 35 feet. A tractor-drawn pan (12-yard) easily removes the soft clay. Weathered schist or hard-packed clay is loosened first by a rooter attachment.

Dikes are mined in a series of benches. However, before the benches can be established, the uneven cap rock, exposed by stripping, is leveled by drilling horizontal holes from the side cuts and blasting. After the benches are started, all drilling is done vertically.

As the dikes are mined, the country rock on hanging wall side is sloped back and benched to prevent sluffing. The footwall side of the dike is fairly competent and no sluffing occurs. All drilling, blasting, and loading operations in the country rock are closely supervised to prevent indiscriminate mixing of ore and waste.

Maximum depth for mining the dikes by surface methods will be 80 feet. Definite plans for underground methods have not been formulated, but preliminary considerations include sinking shafts and mining by shrinkage stoping. Diamond drill holes have proved the dikes to a depth of 250 feet. Further exploratory drilling is included in future plans.

Jumbos Are Used for Drilling

Small, self-propelled, tractor-mounted jumbos are used for drilling vertical holes on the benches of the dikes. Two air-controlled jibs, with Cleveland 4-inch drifters, are mounted on "Terratrac" tractors. Air is supplied by an I-R "Gyra-Flo" portable compressor which is towed behind the tractor. Drill steel is 1¼-inch round lugged, and four changes—6-foot, 12-foot, 18-foot, and 24-foot—are used. Bits are the tungsten-carbide, detachable type.

For the more inaccessible drilling locations, such as drilling on the cap rock, a rubber-tired wagon drill is used. This also mounts a 4-inch drifter-type machine.

A 40-percent special gelatin, electrically fired, is used for blasting. Because of the weathering of the cap rock, initial breakage is not as high per pound of explosive as breakage of the unaltered, deeper-lying portions of the dike. At the present time, from 0.6 to 1 pound of power is consumed per ton of broken rock.

Broken rock is loaded by either Cat D-6 front-end loaders or Eimco 105's and trammed to the stockpile or waste dump in 6-ton Koehring Dumptors. Ore from the stockpile is loaded by a ¾-yard Bucyrus-Erie Diesel shovel. Haulage from the mine to the plant, a distance of approximately 14 miles, has been contracted to a local trucking firm.

Indian Creek Mine

The Indian Creek property lies in a triangle formed by the junction of Indian Creek and the South Fork of the Catawba River in Lincoln County. It consists of many small dikes which have coalesced to form one large orebody.

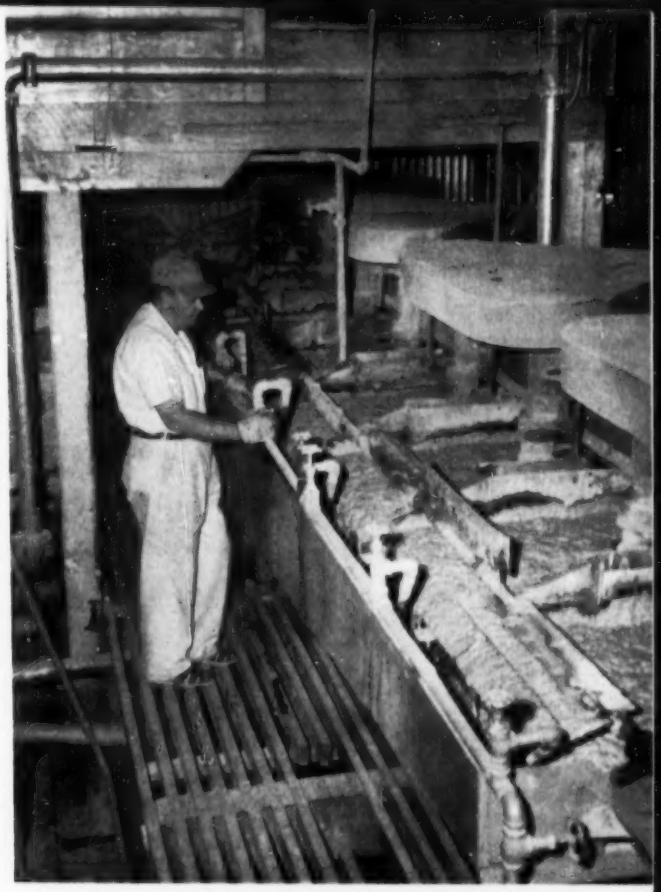
Shaped similar to a half moon, it is 900 feet long and has a maximum thickness at the center of 365 feet. Open-pit methods will be used to mine the orebody down to the water level of the stream—a distance of 180 feet.

Because of the nature of the deposit, with the dikes coming together at

Continued on page 76

INDIAN CREEK ORE is loaded by a 1½-yard Bucyrus Erie Diesel shovel. Contractors haul the ore 16 miles to the Bessemer City plant. J. N. McClure, mine manager, watches the loading.

How MCA Floats Rare Earths In Heated Circuit



FIVE-STAGE CLEANING is done in this Denver Sub A flotation machine. The mill operator is shown checking the froth overflowing the first and second cleaners. Fifth cleaner froth is flotation concentrate.

By STANLEY H. DAYTON

Associate Editor

Rare earths are no longer rare. Two factors have brought this about. First came the 1950 discovery of one of the world's greatest deposits of bastnaesite ore (a rare earth fluocarbonate) at Mountain Pass, California, 60 miles southwest of Las Vegas, Nevada. Next, metallurgists developed suitable concentration practices for recovering the rare earth mineral from the ore. Molybdenum Corporation of America, now treating 160 tons of ore per day, would expand facilities to handle 500 to 1,000 tons if market conditions were favorable.

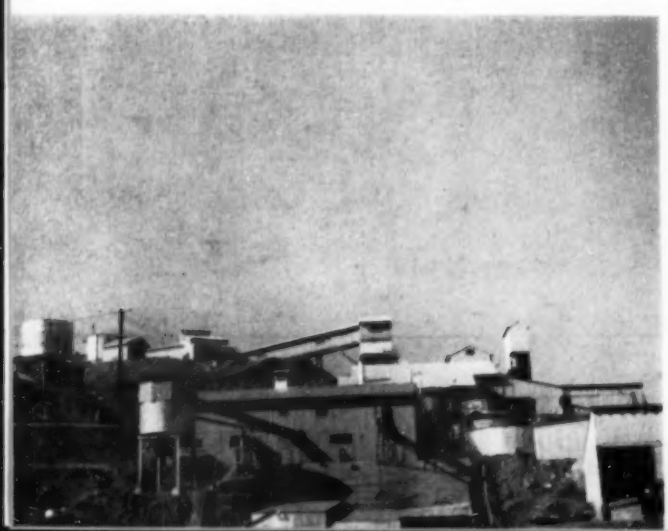
MCA, which acquired the deposit in 1951, uses a combination of flotation, acid leaching, and roasting to make a plus-90-percent concentrate at its compact mill. Process heat, however, proved to be the real key to successful low cost concentration.

The rare earth mineral found at the Mountain Pass deposit is known as bastnaesite, a fluocarbonate, chiefly of cerium, lanthanum, neodymimum, and praseodymium. Although traces of most of the other 15 rare earth elements are found, the above named comprise over 90 percent of those found at this deposit.

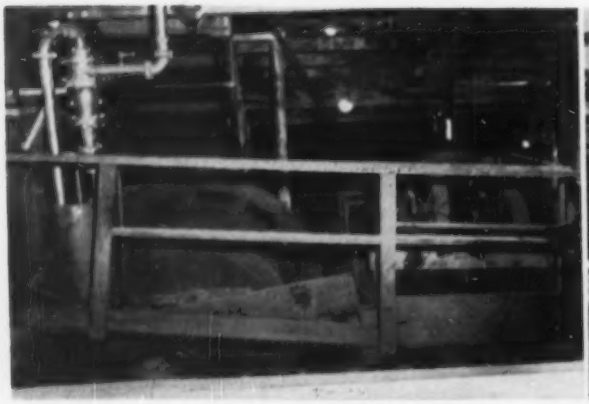
Rare earths in the Mountain Pass district were discovered in 1949 by H. E. Woodward, and Clarence Watkins while prospecting for uranium with a Geiger counter. Trace amounts of uranium and thorium caused the counter to react, but later analysis and identification by E. T. Schenk of the U. S. Bureau of Mines proved the presence of bastnaesite. Mr. Woodward later participated in developing the ore dressing process and is now metallurgist at MCA's present operation.

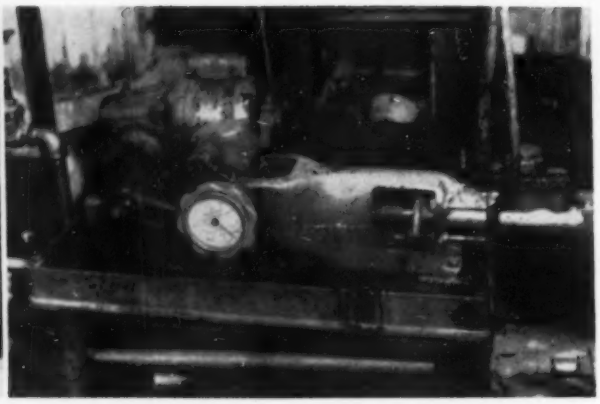
The United States Geological Survey played a large part in the development and mapping of the Mountain Pass district and deposit. The complete geologic story is very excellently covered in Professional Paper No. 261.

The deposit is contained in a mineralized belt of Pre-Cambrian metamorphic and igneous rocks nearly 5 miles long and 1½ miles wide. It is an irregular vein, over 2,000 feet long and 200 feet thick, composed largely of carbonates, but also containing abundant barite and some quartz.

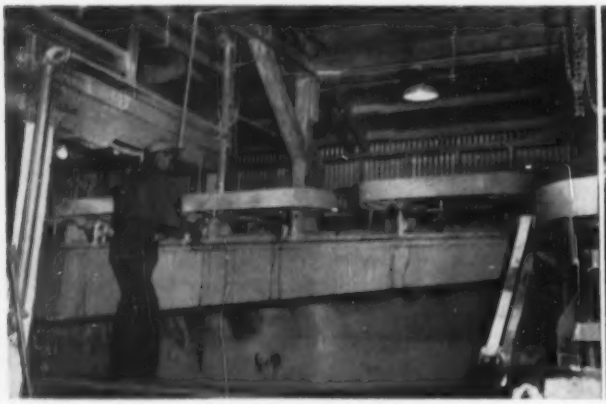


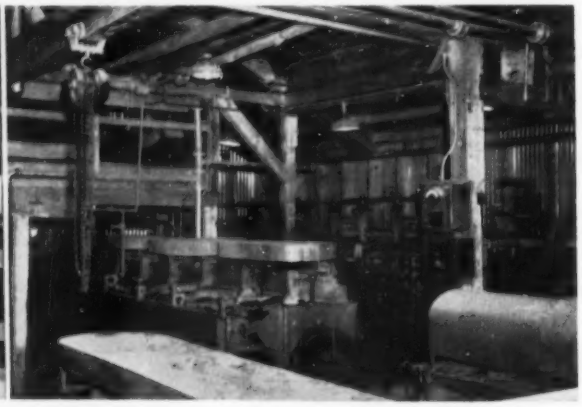
MOLYBDENUM CORPORATION'S rare earth flotation mill. Coarse ore bin and crushers are in building at top left. Mill building is below center conveyor gallery. Thickeners are at right center.





GRINDING CIRCUIT is shown at left. The 4-by 5-foot Marcy mill is in closed circuit with classifier. The DorrClone (top left) is fed first-cleaner tailing. Underflow is reground, overflow goes to flotation roughers. Miltonroy pump, at right, meters reagents.





FLOTATION IS KEY to bastnaesite recovery at Molydenum Corporation's Mountain Pass mill. At left are the Denver cleaners. The eight Agitair and four Fagergren rougher cells are in right background of picture at right.

Exploration and development have outlined what is probably the world's largest deposit of bastnaesite, and also the highest in grade. Mining is done by open pitting at a number of faces and the grade of mine run ore averages between 7 and 10 percent.

How Process Works

At the mill a 7 to 10 percent rare-earth head feed, after grinding, is boiled in the presence of suitable conditioners and depressants; following this, it is pumped to a flotation circuit to make a 63 percent concentrate. Acid leaching then upgrades the flotation concentrate to 72 percent by dissolving carbonates trapped in the flotation froths. The leached residue is passed through an Edwards roaster which burns off the carbon dioxide content of the bastnaesite leaving a plus-90-percent rare earth oxide.

Heat is necessary for the flotation process. The high temperature seems to result in the firm attachment of fatty acid collector to the rare earth mineral, if the pulp is boiled in the presence of the correct amounts of depressants and collectors. The gangue minerals, notably barite and calcite, are selectively depressed, while the rare earth minerals are recovered in the froth. Ammonium lignin sulphate, more commonly known as Orzan A, is the reagent used to depress the carbonates. Actually, barite is a far more troublesome constituent than the carbonates, but hot conditioning and flotation as temperatures above 100° F. increase selectivity and produce cleaner froths.

Flowsheet Details

Here's how the flowsheet operates. Trucks dump mine run ore in the coarse ore bin, and the feed is crushed to minus-¾-inch in two stages. First, it is fed through a jaw crusher and a Symons cone crusher. Hardinge feeders, operating under the fine ore bins, draw this feed for transfer to a 4½- by 8-foot rod mill which discharges a minus-10-mesh product. From two to six pounds of soda ash per ton of feed are added just ahead of the rod mill to maintain pH control at about 9.5.

The rod mill product is piped to a Dorr classifier operating in closed circuit with a Marcy 4- by 5-foot ball mill. The classifier overflow, containing 52 percent solids and 96 percent minus-100-mesh, then flows through a series of three heated tanks. In the first tank, the pulp temperature is elevated to 140° F. by utilizing waste heat from Diesel-generator sets at the power plant. Temperature is increased to 180°, then to 200° F. in the second and third tanks by boiler steam from a 150-horsepower boiler plant which furnishes steam at 125 pounds per square inch pressure. Holding capacity of the series of tanks is sufficient to provide a total pulp retention time

Table No. I

Some Pertinent Facts on Molybdenum Corporation of America's Mountain Pass Mill

Mill Feed	7 to 10 percent rare earth oxide
Rougher concentrate	35 percent rare earth oxide
1st cleaner concentrate	45 percent rare earth oxide
2nd cleaner concentrate	50 percent rare earth oxide
3rd cleaner concentrate	55 percent rare earth oxide
4th cleaner concentrate	60 percent rare earth oxide
5th cleaner concentrate	63 percent rare earth oxide
Acid leached concentrate	72 percent rare earth oxide
Roasted concentrate	Plus 90 percent rare earth oxide
Crushing capacity	25 tons per hour
Grinding capacity	150 tons per day

of five minutes in the boil, or third, tank. Reagents consisting of Emersol 300 (oleic-olien collector), Orzan A, and acid silicate are added between the second heat tank and the third boil tank.

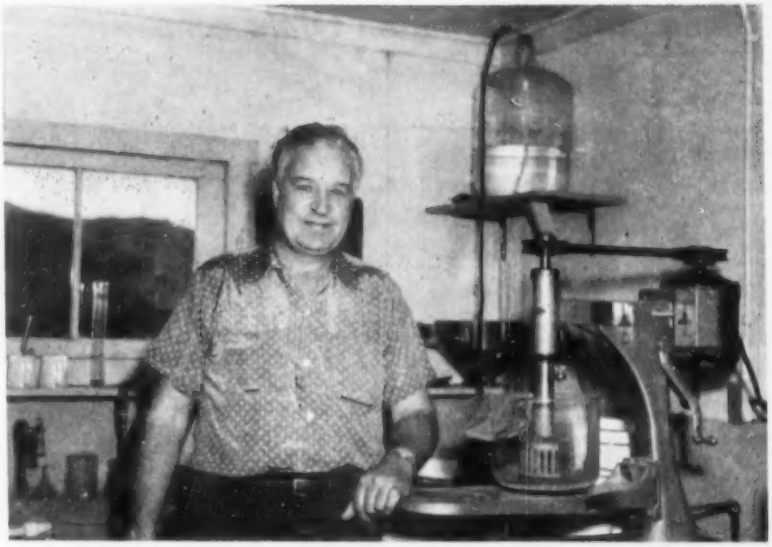
Rougher Pulp 130° F.

Hot pulp, at a temperature of 130° F., reports to the flotation roughers made up of four Fagergren and eight Agitair machines. The roughers produce a finished tail and a froth which is cleaned in five stages in Denver 18S flotation cells. Froth from each cleaner advances to the next stage, and tail from each cleaner is recycled to the preceding cell. Fifth cleaner froth flows to acid leach tanks and first cleaner tails report to a classifying cyclone. The cyclone underflow is returned to the ball mill-classifier circuit for regrinding, and the overflow reports to the rougher cells.

The flotation operation concentrates the rare earth content of the feed to 63 percent following the fifth cleaning stage (see Table). This 63 percent concentrate is leached in a counter current decantation process with a 10 percent solution of HCl to remove carbonate gangue in the overflowing froths. Leaching increases the grade from 63 to 72 percent. Leach residue is thickened and filtered periodically. The leached concentrates are calcined in an Edwards roaster which burns off the fluocarbonate content of the rare earth minerals leaving a plus-90-percent rare earth oxide.

Present Uses of Rare Earths

Comparatively little is known of the rare earths and their properties individually. The high-grade concentrate produced at the mill contains some of each of the 15 elements, but no attempt is made to separate them. Rare earth fluorides and oxides are used as cores for high luminosity carbon electrodes (the rare earth compounds produce a more brilliant white light) used in photography. Pyrophoric properties of rare earth metals, such as the alloy ferrocerium, can be used to advantage in lighter flints or in making tracer bullets. Mischmetal, an alloy of all rare earth metals, is used for making ferrocerium, and has been used in quantities up to 11 percent in aluminum alloys. Mischmetal has improved the strength of aluminum at elevated temperatures. Other uses are found in anti-sickness remedies, polishing materials, and in ceramics.

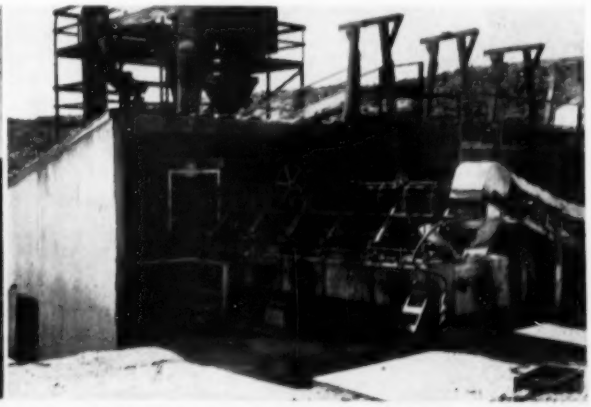


RARE EARTH DISCOVERER, H. E. Woodward in the experimental ore dressing laboratory. He is now plant metallurgist and was instrumental in developing the flotation process. His discovery was made in 1950 while prospecting for uranium.

What Does Future Hold?

Research work continues to progress on the use of rare earth elements as alloying agents in steel. Investigations have shown that rare earths improve several properties of alloy and carbon steel. The great bulk of the work of this nature is being done with the co-operation of leading steel companies in making commercial heats.

In some types of stainles steel the use of rare earths is practically standard practice. Many other types of alloy and carbon steel are now being made on a production basis. Certainly the future of these metals seems to lie in their increasing use as alloying agents. Since so little is known of the rare earth group, there is naturally a considerable lag in product development. It is up to the physical metallurgist to more clearly outline the future demand. But one thing is certain, between the Idaho monazite and the deposit at Mountain Pass, the United States has a ready supply.



ROASTING IS AN IMPORTANT STEP in upgrading the rare earth concentrate. The Edwards roaster is housed in building with dust cyclones on top. Feed end of the roaster is shown at right. Flotation concentrate, which has been acid leached to remove gangue, is cycled through the roaster where the fluocarbonate content of the bastnaesite is burned off.

Among those serving on OMM committees . . .

Copper...


A. B. Bowman


H. B. Ewoldt


E. S. McGlone


F. R. Milliken


C. D. Tripp

Chromite...


F. Bristol

Tungsten...


A. H. Bunker


R. A. Hardy


J. W. Hoefling


C. Segerstom, Jr.

Beryllium...


L. G. Bliss


M. J. Donachie

OMM Selects Mineral

The Office of Minerals Mobilization has appointed 14 Industry Advisory Committees to consult and advise OMM on mineral matters. The committees are to serve as contacts between the mining industry and the government. The committees and their members are:

Aluminum Committee: Robert K. Beck, Apex Smelting Co.; R. B. Caples, Anaconda Aluminum Co.; Richard L. Davies, Pennsalt International Corp.; Lawrence Litchfield Jr., Aluminum Company of America; D. A. Rhoades, Kaiser Aluminum & Chemical Corp.; Walter L. Rice, Reynolds Metals Co.

Antimony Committee: James P. Bradley, Bradley Mining Co.; William B. Clancy, American Smelting & Refining Co.; Marc S. Goldsmith, Goldsmith Bros. Smelting & Refining Co.; Robert M. Hardy Jr., Sunshine Mining Co; J. W. Iliff, Harshaw Chemical Co.; F. S. Mulock, U. S. Smelting Refining & Mining Co.; Robert L. McGean, McGean Chemical Co.; Frederick R. McIntosh, C. Tennant Sons & Co. of New York; Walton S. Smith, Metal & Thermit Corp.; W. J. Welch, National Lead Co.

Beryl Committee: George V. Bland, Bland Mining & Milling Co.; L. G. Bliss, Foote Mineral Co.; M. J. Donachie, Beryllium Corp.; Arthur Montgomery, Harding Mine; Jay E. Rand, Whitehall Co., Inc.; J. R. Wemlinger, Beryllium Mining Co., Inc.

Chromite Committee: Fay I. Bristol, Bristol Silica Co.; Charles F. Colbert Jr., Pittsburgh Metallurgical Co., Inc.; W. Philip Cox, Chromium Mining & Smelting Corp., Ltd.; R. L. Cunningham, Ohio Ferro-Alloys Corp.; Dr. Alex L. Field, Armco Steel Corp.; George C. Floyd, Vanadium Corporation of America; Fred S. Haggerson, Union Carbide and Carbon Corp.; Durand Hall, Castro Mining Co.; Joseph R. Holman, Joseph R. Holman; Dr. Andrew Leith, E. J. Lavino & Co.; Robert E. Leoni, Wm. H. Muller & Co., Inc.; W. B. Pierce, Allegheny Ludlum Steel Corp.; William S. Robertson, Oregon Chrome Mines, Inc.; Simon Seidenbond, Leonard J. Buck, Inc.

Columbium-Tantalum Committee: E. H. Driggs, Fansteel Metallurgical Corp.; Fred S. Haggerson, Union Carbide & Carbon Corp.; K. C. Li, Wah Chang Corp.; Philip M. McKenna, Kennametal, Inc.; Robert P. Porter, Porter Bros. Corp.

Copper Committee: Walter C. Bennett, Phelps Dodge Refining Corp.; A. B. Bowman, Banner Mining Co.; Kenneth C. Brownell, AS&R; John F. Cowley, Appalachian Sulphides, Inc.; Harold B. Ewoldt, Copper Range Co.; John H. Ffolliott, Miami Copper Co.; W. P. Goss, Magma Copper Co.; William W. Lynch, Calumet & Hecla; E. S. McGlone, Anaconda Co.; Frank R. Milliken, Kennecott Copper Corp.; Harold H. Sharp, Howe Sound Co.; Chester D. Tripp, Consolidated Coppermines Corp.; Jean Vuillequez, American Metal Co., Ltd.; E. H. Westlake, Tennessee Corp.

Lead...


J. D. Bradley


A. Fletcher


S. D. Strauss


W. H. H. Cranmer

Manganese...


J. H. Cole


W. L. Long

Antimony...

J. P. Bradley

R. M. Hardy, Jr.

Zinc...

J. Jensen

J. A. Martino

E. H. Snyder

H. I. Young

Fluorspar...

C. O. Anderson

R. H. Dickson

G. Montgomery

Mercury...

W. Bradley

G. I. Gould

S. H. Williston

Advisory Committees

Fluorspar Committee: N. F. Adick, Miller-Adick Co.; C. O. Anderson, Ozark-Mahoning Co.; Jacob Blecheisen, Rosiclare Lead & Fluorspar Mining Co.; Peter D. Caron, AS&R; Robert H. Dickson, Allied Chemical & Dye Corp.; Robert N. Frazer, Kentucky Fluorspar Co., Inc.; Lawrence Litchfield Jr., Alcoa; Louis J. Lipton, Continental Ore Corp.; Gill Montgomery, Minerva Oil Co.

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Manganese Committee: Paul J. Bertelsen, Paul J. Bertelsen; M. M. Bowman, African Metals Corp.; Leonard J. Buck, Leonard J. Buck, Inc.; John H. Cole, Domestic Manganese & Development Co.; R. H. Cromwell, Electro Manganese Corp.; S. S. Groggins, M. Golodetz & Co.; Fred S. Haggerson, Union Carbide & Carbon Corp.; Sanford R. Knapp, Taylor-Knapp Co.; Dr. Andrew Leith, E. J. Lavino & Co.; W. Lunsford Long, Manganese, Inc.; Robert M. Lloyd, U. S. Steel Corp.; Leslie B. Manning, American Machine & Metals, Inc.; E. S. McGlone, Anaconda Co.; Floyd M. Simmons, Southeastern Manganese Corp.; Ivor D. Sims, Bethlehem Steel Co.; Edward H. Snyder, Combined Metals Reduction Co.; Al Stovall, Stovall Managnese.

Mercury Committee: A. L. Albee, Bonanza Oil & Mine Corp.; Worthen Bradley, Bradley Mining Co.; S. J. Buckman, Buckman Laboratories, Inc.; Gordon I. Gould, Gordon I. Gould & Co.; Herbert R. Meyer, Ayrton Metal & Ore Corp.; Leo G. Nunes, Leghorn Trading Co., Inc.; J. J. Oberbillig, United Mercury Mines Co.; R. F. O'Bryan, California Quicksilver Mines, Inc.; J. M. Powelson, Sonoma Quicksilver Mines, Inc.; S. Ullmann, Philipp Brothers, Inc.; S. H. Williston, Cordero Mining Co.

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Zinc Committee: Thomas Bardon, Shattuck Denn Mining Corp.; John D. Bradley, Bunker Hill & Sullivan Mining & Concentrating Co.; R. B. Caples, Anaconda Co.; Herman D. Carus, Matthiessen & Hegeler Zinc Co.; W. H. H. Cranmer, New Park Mining Co.; William R. Dice, Eagle-Picher Co.; Andrew Fletcher, St. Joseph Lead Co.; Sherman B. Hinckley, Rico Argentine Mining Co.; Jens Jensen, Pend Oreille Mines & Metals Co.; S. T. Johnston, U. S. Steel Corp.; Robert G. Kenly, New Jersey Zinc Co.; Warren H. Leverett, National Zinc Co., Inc.; J. A. Martino, National Lead Co.; F. S. Mulock, U. S. Smelting, Refining & Mining Co.; Edward H. Snyder, Combined Metals Reduction Co.; Simon D. Strauss, AS&R; Jean Vuillequez, American Metal Co., Ltd.; Howard I. Young, American Zinc, Lead & Smelting Co.

Aluminum...

R. B. Caples

L. Litchfield, Jr.

D. A. Rhodes

ROUGH COUNTRY MADE EASY. The picture above shows a Bell helicopter flying over typical uranium-bearing formations. Try prospecting it on foot. "Here's where we want to land," says the geologist to the pilot in the picture below.

Prospecting With Helicopters

By Ben Bowyer

The helicopter has become an important and, in many instances, an indispensable tool for the search and development of mineral deposits throughout the world. Presently, it is proving to be particularly adaptable to the exacting requirements of uranium exploration in the western United States.

In the quest for uranium, helicopters are being used by mining companies and prospectors as a time-saving method of transporting men and equipment into remote or otherwise inaccessible areas, and in the search for unknown ore deposits.

The use of helicopters for uranium prospecting is due to the great maneuverability, safety at low flying speeds (to actually hover if desired), and ability to land safely in close proximity to radioactive geologic formations.

Mr. Bowyer is field geologist for the Bell Exploration and Development Corporation.

Until recently, high altitudes coupled with warm temperatures formed a barrier limiting the helicopter's scope of operations. Because of this, many high areas in the western states have not been prospected adequately.

Recognizing the limitations of early helicopters, Bell Aircraft Corporation has introduced new models which already have proved satisfactory at the highest elevations encountered in mining operations in the United States.

PILOT-GEOLOGIST-AUTHOR Ben Bowyer in the Bell helicopter. Note the continuous strip recording unit in front of him that makes a permanent record of anomalies.

Uranium Detection Equipment

The increased use of the helicopter for radiometric grid-pattern surveys and "rim-flying" also must be attributed in large measure to the development of lighter, sturdier, and more sensitive instruments for radioactive detection.

Nuclear Enterprises, Ltd. of Winnipeg, Canada has been one of the leaders in the development of such equipment, and all helicopters used by the Bell Exploration and Development Corporation (BEDCO) for uranium prospecting are equipped with a Nuclear Enterprises Mark VI A Scintillometer.

The scintillation equipment used by BEDCO is installed within the cockpit of the helicopter, directly in front of the geologist-observer. For interpreting the amount of radioactivity change over a given area, there are two meters: one faces the pilot, and the other is mounted in front of the observer. Both are readable either in counts-per-second or milli Roentgens per hour.

An Esterline-Angus model AW recorder can be mounted on the observer's side of the cockpit to make a continuous and permanent record of the radioactivity along any traverse. This recorder may easily be removed.

The entire ensemble, including the scintillation equipment, detector probe, recorder, panel and mount,

FIND THE HELICOPTER. Yes there it is flying under the highway bridge spanning the San Juan River at Mexican Hat, Utah. This picture dramatically illustrates the versatility of the helicopter and its ability to hover and prospect along cliffs.

SAGE BRUSH LANDING FIELD is all you need for a uranium-hunting helicopter. It lands you right where you want to closely check the geology.

may be removed from the helicopter in a matter of minutes if work other than radiometric surveying is planned.

Fly to the Job

The helicopter offers the ideal means of transportation for a geologist. Not only can it fly the geologist in minutes into areas that would normally take hours to reach, but from his vantage point in the air the geologist can make observations which normally would be impossible. As an example of the helicopter's ability to aid the geologist, let us go "rim-flying" in the hunt for uranium.

Within a few minutes after leaving camp, the geologist is at the starting point of his pre-planned traverse. In the cockpit are instruments for the detection of radioactivity, all necessary base maps, and field equipment.

Upon reaching the starting point of the traverse, the geologist tells the pilot what rock formations he wishes to prospect, and approximately what speed and altitude would be best. The pilot, with occasional supplemental directions, can then follow the designated formation while the geologist is free to mark the course of flight on his base map, watch his instruments for tell-tale signs of radioactive anomalies, and observe other rock formations in the vicinity for clues such as alteration, change of color, abundant carbonized material, or thick sandstone lenses, which might point to the possible presence of uranium.

Speed Up Prospecting

In this manner the helicopter-borne geologist can easily cover 125 miles or more of traverse a day over the roughest terrain and with a degree of accuracy and completeness that is practically unobtainable by other methods. Weeks would be required for a geologist on the ground to accomplish the same work. Then too, when an anomaly is spotted the helicopter can land and the geologist can make a preliminary examination. If the area appears favorable, he can then, with the aid of the pilot, locate several claims and fly to the county seat and file them the same day. Additional surveying parties may be flown in later.

There are many other ways in which the geologist can utilize the helicopter. Those that quickly come to mind are the use of helicopters for flying geophysical surveys, for reconnaissance geological mapping, for transporting geological personnel into remote or high areas for the purpose of detailed geological or typographical mapping, and for flying drill rigs and their crews into areas not accessible by roads.

The practical helicopter is here—now it is left to the management and personnel of the mining industry to recognize its many advantages and thereby profit by its use.

SMALL GROUPS like this gathered in the ornate lobby of the Davenport Hotel to talk over problems and renew friendships.

Attendance Record Broken at 61st Annual Northwest Mining Convention

A record breaking number of mining men registered for the 61st annual Northwest Mining Association Convention held in Spokane, Washington December 2 and 3. These are some of the ideas that they expressed: The association urged a nine-point program for amendment of the Taft-Hartley labor act; proposed several changes in the mining law; called for tax changes; asked for appropriate action to insure a strong domestic industry; and sought adequate local public hearings to air protests when public lands are withdrawn from mineral entry.

What were convention highlights? One would have to include growth. Each year the convention is bigger and better. But the dominate theme was the spirit of close association between the mining man in the field and the mining student.

As one engineering college president put it. "Today not enough young men are being drawn into this virile, active (mining) industry with its great opportunities." Well, the Northwest Mining Association made one important move in that direction. They offered the students in nearby colleges and universities a low-cost package rate which included all charges for registration and convention events, such as luncheons, banquets, etc. A great many students attended the activities, and many went home with fresh ideas.

It was heartening to note that north west men recognized that if the industry is to go forward, closer ties must be established with those men in training.

Events got underway Friday morning when Karl W. Jasper, president of the Northwest Mining Association, delivered a welcoming address. He was followed by Miles P. Romney, manager of the Utah Mining Association, who urged a national mineral policy for mining.

A FRANK APPRAISAL of long range problems was given by Dr. J. R. Van Pelt, president, Montana School of Mines.

Food For Thought

"Government has a real place in clearing away the road-blocks that might stop an industry, but under our American system, industry itself must provide the energy for industrial progress and the leadership that controls the rate and direction of growth." So said Dr. J. R. Van Pelt, President, Montana School of Mines, speaking before delegates to the convention at a joint luncheon with the Spokane Chamber of Commerce. In his address, Dr. Van Pelt emphasized the fact that the mining industry must prepare itself for the problems of the future; namely, how to meet the vastly increased demand for metals and minerals which has been predicted for the future by President Eisenhower's Materials Policy Commission. He said that the miner's problem over the long range is not that of selling so much as that of producing.

How is this problem to be met? More deposits must be found, according to Dr. Van Pelt. This means stepped up activity in exploration, plus the development and use of new and

"EACH YEAR THIS CONVENTION HAS IMPROVED," said Frank E. Woodside (left) who has been attending Northwest Mining Convention for 55 years. He is welcomed by Karl Jasper, president of the Northwest Mining Association.

EAST MEETS WEST. Shown chatting are two men from widely separated areas of the world. At left is R. A. Suraprada who heads the Indonesian Bureau of Mines. At the right is W. H. Bradley, chief geologist, United States Geological Survey.

SHOWN REGISTERING is Roy Traeger of The Anaconda Company's fertilizer division. He is superintendent of the Conda mine, a phosphate producer in Idaho. The convention also attracted a number of Canadian mining men.

better tools and methods for locating the hidden ore body.

Better Methods

It also means that operators must work lower grade ores, rework old tailings and underground residuals, develop more economical methods for recovery and extraction of ores and metals. Pointing out that the percentage of growth in the mining industry has been very small over the years, he urged more companies to invest increased funds as well as talent in research to meet these goals. He also pointed out that the minerals industry has not been attracting enough young men from schools and colleges. It is up to the industry to channel the right kind of men into mineral engineering, and thereby provide insurance against stagnation and lowered profits in the future.

Mining Highlights

At this highly interesting meeting, delegates heard about the application of jacklegs for drilling longholes up to 157 feet in length; an excellent description of the geology of the Hercules mine near Burke, Idaho where, in contrast to other mines in the district, wall rock alteration is practically lacking; a summary of results obtained by geochemical soil sampling methods in several Montana mineral districts; and probably most unusual, a talk on how a mining company inaugurated a diamond drilling program high in the snow packed Cascades of Washington where men, machines and supplies were flown in by helicopter.

At the Bunker Hill and Crescent mines in the Coeur d'Alene district, much of the ore is irregular in outline and in places lies in structurally complex areas. Quite often it is necessary to do extensive drilling in conjunction with drifting, cross-cutting, or raising to delineate ore prior to stoping. In a paper written by D. C. Long, geologist, Bunker Hill and Sullivan Mining and Concentrating Company, and E. B. Olds, superintendent of Crescent Division, the experience gained from 10 months of longhole prospecting with jacklegs was reported. Mr. Olds, who delivered the talk, said that 10,321 feet of drilling had been completed at a cost of $1.31 per foot. Holes average 70 feet in length, but have drilled to 157 feet.

Geology

Garth M. Crosby, senior geologist, Day Mines, Inc. first reviewed the history of the Hercules mine, about two miles north of Burke, Idaho, from

the time the original claims were staked in 1889 to the suspension of operations in 1925 and subsequent unwatering and reopening by Day Mines. The latter project started in 1947 and extends to the present time. Ore disclosed on the lower 800 levels of the old workings led to deeper development and current plans include sinking a vertical winze below the present 1600 level to reach the 1900 level. Aside from the lack of alteration, another unique geological feature is the knotting or kinking of the vein structure along its general north 70° west strike. Three separate "knots," in which the vein turns at least 90° to the right and in a short distance turns back to the left along the former strike, have been disclosed. A reasonable explanation of the cause has not yet been deduced.

Geochemistry, Helicopters

"Investigations of Geochemical Soil Methods" in Montana was the title of the subject presented by Professor Forbes Robertson, Department of Geology, University of Washington. Studies have been made in some 19 different areas and they disclosed one surprising factor. The best results were obtained from samples taken right at the grass roots. Anomalies often show up from 100 to 300 feet down slope over sub-outcrops on hillsides, according to Professor Robertson.

C. C. Goddard, geologist, Bear Creek Mining Company, disclosed how the helicopter aided in setting up a diamond drilling program at the Glacier Peak Mining and Smelting Company in Snohomish County Washington. The previous year a pack train was used to traverse the snow packed trails with the end result that only 2,000 feet of hole was drilled. During the summer of 1955 all equipment and men were flown in at a cost of 19¢ per payload pound on the uphill ride to the property at an elevation of 6,500 feet. Cost for ferrying equipment out at the end of the summer was 15c per payload pound. Air transport permitted an earlier start in operations and more feet drilled during the season when the area is open.

Blasthole Drilling

The annual Sour Dough Breakfast started the Saturday morning program, and proved a worthy eye opener. This stag affair has always been one of the most popular attractions each year, and 1955 was no exception.

Two simultaneous sessions, both with loaded programs of speakers, held the attention of visitors following

APPLICATION OF ATOMIC POWER was a session which attracted the following group of men. From left to right are, Sam Thomas, president, Columbia Uranium, Inc., W. A. Lindman, Columbia Uranium, and W. A. Beaudry, Sidney Mining Company.

RELAXING BETWEEN MEETINGS are C. C. Popoff (left), S. H. Lorain (center) and Donald L. Masson (right) Chairman of the Department of Mining at Washington State College. Mr. Popoff and Mr. Lorain are with the United States Bureau of Mines.

DISCUSSING ACTIVITIES at the convention are H. H. Vivian of Vivian Brothers, Inc., at left, and B. L. Cadwell of the Standard Oil Company of California (right). At noon on the final day 625 mining men had registered for the convention.

breakfast. The Canadian Mining Meeting presided over by Chairman H. E. Doelle, president of the Mining Association of British Columbia and managing director of Sheep Creek Gold Mines, highlighted important activities north of the border. Wing G. Agnew, chief, Spokane Field Office, United States Bureau of Mines, headed the second gathering.

James Brammer, quarry engineer at Northwest Magnesite Company, Chewelah, Washington, delivered a fine, detailed account of drilling operations at the mine in his paper titled "The Joy Drill." Equipment used for blast hole work has undergone an evolution from wagon drills to rotary drilling. He reported that one rotary rig produced 1,600 to 1,900 tons of rock per shift. Total drill time varied from 76 to 80 percent of the total time available and bit costs were 14 mills per ton of rock.

Rock Bolts Save Money

Rock bolts have changed the operational picture at the Mountain Con mine in Butte considerably, according to a report given by V. D. O'Leary, mine superintendent, the Anaconda Company. Workings at the mine were heavily timbered before rock bolts were adapted. Stopes were supported by square sets or some modification of square sets. Now less than 23 percent of the excavation is timbered. Smaller headings and reduction of timber handling for sill work have cut costs by $7.00 per foot of advance. In stopes a cut and fill method has been made possible through the use of rock bolts which has resulted in these advantages: tons broken per stope increased 43.6 percent; explosive cost per ton declined 58.2 percent; all supply costs per ton declined 26.3 percent; total cost per ton, including wages, declined 12.3 percent.

Stope Filling

Hydraulic Stope Filling at the Blackbird Mine was the subject discussed by Cecil J. Whitley, Chief engineer, Calera Mining Company. Mine production at the Howe Sound subsidiary now stands at 700 tons per day, but is expected to reach 1,000 tons per day in the near future. Mr. Whitley reports that the filling operation is somewhat unique in that all stopes are above the mill level. The material is introduced to the mine through 6,700 feet of 6-inch pipe from the treatment plant near the mill. The total dynamic head is 809 feet.

Roger V. Pierce, a Salt Lake City mining consultant in management and mining mechanization, reviewed the development of four new machines for the industry. His talk covered specifically the Cryderman shaft mucker which can be used either in vertical or inclined shafts; a large, hydraulically controlled rotary drill which can bore a hole 6 feet in diameter for mine shaft use; a multiple car loader for drift work, and a large rotary continuous miner for drilling water level or drift openings.

Canadian Mining

"Seldom if ever, in the history of Canadian mining has so much new wealth been developed as quickly and as cheaply as in the Algoma district" said Donald E. Smith, general superintendent Pronto Uranium Mines Ltd. He traced the rapid exploration and development of uranium deposits in the Ontario province.

Dr. John F. Walker, Deputy Minister of Mines for British Columbia, started the Canadian Mining session by describing new developments in Northern British Columbia. The isolated northern reaches are being opened by new roads in former wilderness areas. They should prove important factors in locating new discoveries of mineral wealth.

Long hole blast drilling at the Reeves MacDonald mine was reported by J. B. Shanon, mine superintendent. Rounding out the program was a discussion of powder blast mining at Britannia Mining and Smelting Co. by A. L. Allan, mine superintendent.

And Uranium

First speaker at the uranium session was Ernest E. Thurlow, chief, Salt Lake Branch Division of Raw Materials, United States Atomic Energy Commission. His subject—"Exploration for Uranium." He reviewed the various stages of development and production in the world's major uranium provinces—South African and the Belgian Congo, Europe, the Canadian shield and the Blind River district, the Colorado Plateau and surrounding area, and Australia. Uranium occurrences in the Spokane area also came in for considerable discussion.

Mr. Thurlow declared that controlled fusion will supplement rather than replace uranium in the energy field and that thorium is still in the infant stage. Many years will pass before research can place thorium in a competitive position. He added that for the long-term picture, more uranium reserves must be discovered. The United States cannot depend on present reserves to meet future demand.

Mill For Spokane?

The Spokane area's first uranium producer was described in detail by Robert J. Hundhausen, manager, Dawn Mining Company. The initial discovery by two members of the Spokane Indian Tribe; the subsequent exploration and development by both Midnite Mines, Inc. and the Newmont Mining Corporation subsidiary, Dawn Mining Company which took over the operation in May 1955, were topics covered in the talk. Dawn Mining Company now has three open pits developed. A recent sample has been shipped to Grand Junction, Colorado for metallurgical testing on a pilot plant scale. This work, reported Mr. Hundhausen, should be completed in January or February. He stated that on completion of the test work the company will have relatively exact data on which to predict costs and methods, and then will be in a position to study processes and possibly design a mill for the Spokane area.

RIP Process

A New Acid Process For Uranium Ores was the subject selected by E. C. Bitzer, president, Nuclear Metals Corporation. Unfortunately Mr. Bitzer was unable to attend the convention and his paper was delivered in absentia. He traced the development and use of ion exchange methods of precipitation of uranium from pregnant acid solutions from the initial South African practice to the present resin-in-pulp method now used at the Anaconda mill near Grants, New Mexico and the AEC mill at Monticello, Utah.

The only commercial uranium placer deposit in the world is being dredged in Bear Valley in central Idaho, according to E. F. Cook, Department of Geology and Geography, University of Idaho. He declared that at least 16 radioactive minerals have been identified at various localities in the state in a wide variety of geologic environments. Large low-grade uranium reserves occur in the wirespread Phosphoria formation extending from southeastern Idaho to the Centennial Range on the Montana-Idaho border. Pointing out that a process has been developed to recover byproduct uranium from Florida phosphate operations, he said that it is only a matter of time until a similar process is applied to the Idaho phosphate.

The convention closed Saturday evening with the annual banquet held in the lobby of the Davenport Hotel.

United States

Personalities in the News

Vernon L. Mattson, manager of mining and ore processing, and **John A. Masters,** manager of uranium exploration, have been given expanded duties with Kerr-McGee Oil Industries, Inc. They were named to assume the duties of **G. R. (Buffalo) Kennedy,** formerly manager of uranium exploration. Dr. Mattson joined Kerr-McGee last summer to direct the firm's expanding activities in metallurgical research, uranium mining and milling, and the mining and processing of potash. Mr. Masters was formerly with the United States Atomic Energy Commission. He has been with Kerr-McGee since 1953.

Frank S. Bergstrom, Pioneer Mining Company, has been named president of the Minnesota iron mining firm. He succeeds **Patrick Butler,** who will serve as chairman of the board. The firm operates the Mary Ellen mine near Biwabik, Minnesota.

Edwin J. Eisenach, Climax Molybdenum Company, has been appointed general superintendent of mining and milling operations for the company. In this capacity he will assist **Robert Henderson,** resident manager. **John M. Petty** succeeds Mr. Eisenach as assistant general superintendent, and **William F. Distler** has been promoted to superintendent of the mine department.

Silas Do Foo, formerly with Bradley Mining Company, Stibnite, Idaho, is in charge of the new Ore Dressing Laboratory of Utah Construction Company at Palo Alto, California. Mr. Foo was metallurgist for the Dorr Company (now Dorr-Oliver, Inc.) in 1951 during the firm's ore testing program. At Utah Construction he will be serving under **E. C. Herkenhoff,** who is in charge of all research and beneficiation for Utah Construction's operations. (See MINING WORLD, November 1955, page 61.)

Marshall Haney, consulting mining engineer, Kensington, Maryland, recently completed a survey of Virginia manganese property for a group of Pittsburgh, Pennsylvania interests.

Willis A. Swan was elected to the board of directors of Goldfield Consolidated Mining Company. He has been with the firm for many years, serving as a vice president since 1945.

SHELDON P. WIMPFEN, manager of the Grand Junction, Colorado Operations office of the United States Atomic Energy Commission since 1952, will leave that post next month. He has accepted a position with the Glen Alden Corporation, a Pennsylvania firm which is expanding its activities in chemicals and related fields. A mining engineer, Mr. Wimpfen has had experience in mining work in the western United States, the Philippines, and Bolivia. Prior to coming to Grand Junction he had been assistant director for the AEC's Raw Materials Division in Washington, D. C. His background also includes experience in the technical publication field, having served for a time as editor of the Mining Congress Journal, official organ of the American Mining Congress.

Fred Haley, who resigned as mining manager and engineering geologist for Wyoming Uranium Corporation, has become associated with **Ralph Thurston,** Lander, Wyoming consulting geologist. The partnership will maintain offices in Lander as Thurston & Haley.

Dave Turberville, formerly with the Pima Mining Company, has taken the post of mine superintendent at the Old Dick Mine near Bagdad, Arizona.

Walfrid Been, mine superintendent, Oliver Iron Mining division, United States Steel Corporation, has been appointed head of the mining engineering department of the Michigan College of Mining and Technology.

The following appointments have been announced at the ore mines and quarry works of the Tennessee Coal and Iron division, United States Steel Corporation. **Leland H. Johnson** was named assistant general superintendent; **L. S. Chabot, Jr.,** chief engineer; **E. H. Stevens,** works industrial engineer.

The American Society for Metals has honored **William Justin Kroll** and **Roger W. Straus** for their services to the mining and metallurgical industries. Dr. Kroll, leader in titanium research, has received the Albert Sauveur Award for "pioneering achievements which have stimulated organized research for the advancement of metallurgical knowledge." Mr. Straus, chairman of the American Smelting and Refining Company, received the A.S.M. Medal for "the advancement of research."

Robert F. Bruzewski has been appointed assistant professor to the school of mines and metallurgy, University of Minnesota.

John Fox has been appointed assistant manager of mining division, mining and exploration department, American Metal Company, Ltd., New York City. He was formerly editor of the Mining Congress Journal, official publication of the American Mining Congress.

C. T. Baroch, U.S. Bureau of Mines, is in charge of several metallurgical projects at the Salt Lake City, Utah branch of the Bureau. Formerly, he was assistant chief of the Boulder, Colorado office.

Robert M. Dreyer, exploration department, Kaiser Aluminum & Chemical Corporation, is chief geologist for the department at Oakland, California. Before joining Kaiser in 1953 he was a professor of geology at the University of Kansas and for a time served as chief geologist for Kerr-McGee Oil Industries, Ltd's Navajo Uranium Division.

Art Norman is now with Equipment Engineers, San Fancisco, California. He previously was a mining geologist with the California Division of Mines in San Francisco.

James Schelski, Hibbing, Minnesota, is general foreman of the Carmi iron mine, Pickands Mather & Co.

Arthur W. Goring, chief engineer for Union Carbide Nuclear Company's mining department at Uravan, Colorado, has resigned that position and accepted the post of mining engineer and geologist for Kane Creek Uranium Corporation, Moab, Utah.

Jacob Blecheisen, president of the Rosiclare Lead and Fluorspar Mining Company, Elizabethtown, Illinois, has been appointed a member of the Industry Advisory Committee on Fluorspar by Secretary of the Interior **Douglas McKay.** The committee will consult with and advise the office of

Officers for 1956 have been elected by the American Institute of Mining and Metallurgical Engineers. Heading the list is GROVER J. HOLT (far left), general manager of the ore mining department, Cleveland-Cliffs Iron Company, who was named president for the coming year. Other officers are (left to right): JOSEPH L. GILLSON, geologist in the development department, E. I. du Pont de Nemours & Company, who will serve as vice president of the organization; RUSSELL B. CAPLES, president, Anaconda Aluminum Company and vice president of metallurgical operations, The Anaconda Company, who was elected to a second term as director; ANDREW FLETCHER, president, St. Joseph Lead Company, named for his fourth three-year term as director; CHARLES R. KUZELL, vice president western operations, Phelps Dodge Corporation, who was elected to the post of director; FRED J. MEEK, plant engineer, Fairmont Plant, American Zinc Company of Illinois, named director. The group will hold its annual meeting in New York in February, at which time the annual AIME awards and honors will be presented to outstanding figures in the mining and metallurgical industry.

Minerals Mobilization on matters concerning the mineral and mining industries.

Dean A. McGee, president of Kerr-McGee Oil Industries, Inc. was named "Outstanding Industrialist of the South" by the Southern Association of Science and Industry in Oklahoma City, Oklahoma. Kerr-McGee's Navajo Uranium Division is operator of the $3,000,000 Shiprock, New Mexico uranium processing plant.

Jack Neal and D. W. Jaquay, asbestoes mine operators in the Globe, Arizona area, have been named to an Industry Advisory Committee on Asbestos by Secretary of the Interior Douglas McKay. They will consult with the Office of Minerals Mobilization in its functions with the minerals and mining industry.

OBITUARIES

Raymond J. Barber, 71, mining engineer and educator, died recently in Los Angeles, California. He had been a consultant to the mining enterprises of former President Herbert Hoover.

Clarence D. Huffine, 55, chief mining engineer for Inspiration Consolidated Copper Company, died the latter part of November in Arizona. He had been with the firm for many years and was chief mining engineer since 1929.

Norman Carmichael, 89, former general manager of the old Arizona Copper Company, Morenci, Arizona, died November 15 in California. He was a director of Phelps Dodge Corporation which purchased the property in 1921, from 1922 to 1929.

Armistead Carper, 66, Las Vegas, Nevada mining engineer and geologist, died during November in North Hollywood, California. During his mining career, he was associated with Tonopah Mining Company, the Stratton properties, Union Carbide and Carbon Company, and the Union Mines Development Corporation (Manhattan Project). He had been an active member of the American Mining Congress.

Albert R. Kleinschmidt, 75, Helena, Montana mining man, died during November near the 4-K's Mine which was operated by himself, his brother, and a nephew.

MAX SCHOTT

An Appreciation by

DENNIS F. HALEY
Retired Vice President
Climax Molybdenum Company

The mining and metals industries lost one of their outstanding pioneers and steadfast good friends November 10, 1955 with the passing of Max Schott, member of the board of directors and retired president of Climax Molybdenum Company.

Max Schott was gifted with the indomitable curiosity that makes men pioneer. Search for new knowledge, new materials, and better ways to do things was an innate part of his nature from the time of his birth in Russelsheim, Germany, on March 15, 1876, until his death in New York, New York, nearly 80 years later. It caused him to struggle for a basic education when his farmer parents died before his sixth birthday. It caused him before his 17th year to migrate from Germany to America where he was virtually without a friend. It caused him to educate himself at night school (New York University) in metallurgy and law while picking up English and Spanish and working as a clerk in the offices of American Metal Company, Ltd.

By 1917, Max Schott had worked his way through the ranks to managership of the American Metal Company's Denver, Colorado office. It was there that he became interested in molybdenum. Up to that time the present-day strategically important metal had been nothing more than a laboratory curiosity and now famous Bartlett Mountain was believed commercially valueless. It was because of his faith in the future value of molybdenum and at his instigation that Climax Molybdenum Company was organized. He agreed to become its first general manager in the early formative years of the company, and was elected president in 1930.

Under Max Schott, molybdenum became important the world over as one of the foremost alloying materials for iron and steel and the operations on Bartlett Mountain began to develop into what was to become the largest underground mine in North America. With his leadership, great strides were made in mining and milling methods, strides adopted by mining operations all over the world.

Although Mr. Schott retired as president of Climax in 1946 at the age of 70, he continued to serve its board of directors as a consultant until his death.

Newsmakers in International Mining

D. D. Morris, Consolidated Mining and Smelting Company of Canada, Ltd., has been appointed to the newly created position of assistant to the general manager at Trail, British Columbia. He joined the company in 1928 as an assayer and was named administrative assistant in January 1954.

Max Goldick, concentrator superintendent, Roan Antelope Copper Mines Ltd., Luanshya, Northern Rhodesia, visited Australia and New Zealand during November and December.

Ruben M. Arroyo, formerly of Empresa Minera Morocoala, is mine superintendent for Empresa Minera Quechisla, Atocha, Bolivia.

Jacques Ledoux, who was previously associated with Societe Miniere et Metallurgique de Penarroya in Spain, is now on the staff of Miferma, with headquarters in Paris, France.

Clive Maxwell Norman, mining engineer and consultant, has been named a director and consulting engineer of Camp Bird, Ltd., British mining and finance concern. He is resident director in charge of United States and Western Hemisphere operations. His offices are in New York City.

A. J. Ryan, resident manager of the Reynolds Metals Company bauxite mining operations in Haiti, Jamaica, was a recent guest of Kaiser Bauxite Company, Jamaica. He was taken on a tour of Kaiser's operations in the area.

Felix Gonzales-Bonorino, director of the geological branch, Argentine Mineral Survey, is a visiting professor at the Missouri School of Mines, Jefferson City, Missouri. Dr. Gonzales-Bonorino recently received a grant from the Geological Society of America for a research project dealing with the hydrothermal alteration of rocks associated with ore deposits in the Front Range of Colorado.

G. F. Gripper, chief inspector of Mines, Federation of Malaya, retired in November and has taken up residence in Nyasaland. He joined the department of mines in 1930, was a prisoner of war during the Japanese Occupation, and was appointed chief inspector in 1952. Succeeding Mr. Gripper as chief inspector is **Ian L. Patterson,** formerly deputy chief.

Gabor Dessau is advising the Hebrew Institute of Technology in Haifa, Israel on the setting up of a geological engineering and mining department. In this capacity he is acting under the authorization of the United Nations Educational, Scientific, and Cultural Organization. Mr. Dessau retired in 1953 from Italian government service but has continued as 'charge de cours' of mineral deposits at the University of Naples, Italy and has been in charge of the uranium prospecting center (Centro Ricerche Minerali Radioattivi) of the ENI-AGIP group since the center's inception.

J. H. Vose, Jr., assistant manager, O'okiep Copper Company, Union of South Africa, has been visiting in the United States.

E. M. Lindenau, Compania Minera Choco Pacifico, S.A., has been promoted from resident manager to manager of the Colombian dredging company.

Warren Smith, Phelps Dodge Corporation, Bisbee, Arizona, has been appointed mine superintendent for the development of the Toquepala mine now being undertaken by Southern Peru Copper Corporation. Mr. Smith was pit superintendent of the Lavender Pit operations in Bisbee.

R. M. Haldeman, general manager, Braden Copper Company, has been named chief executive for Braden in Chile. **C. D. Michaelson** formerly chief executive, has become general manager, western mining divisions, for Kennecott Copper Corporation, parent firm of the Chile Copper producer. Mr. Haldeman has been with Braden since 1941. He was named general manager in 1954.

Olaf Odman, Swedish geologist, was in Brazil during November. His trip included an examination of the copper deposits at Caraibas, Bahia State.

William D. Johnson, Jr., chief of the Foreign Geology Branch, United States Geological Survey, was in Brazil recently visiting iron deposits in Minas Gerais State. He also studied zirconium-uranium deposits in the Pocos de Caldas area.

R. N. Martin, British geologist, has arrived in Pakistan on assignment for the United Nations Educational, Social, and Cultural Organization. He will teach petroleum geology at the University of Punjab in Lahore where a department of geology and mineralogy has been established with the help of UNESCO under the direction of **Olaf Anton Broch** of Norway.

Boris J. Kochanowsky, consulting engineer and member of the mining engineering faculty at Pennsylvania State University, is now in the United States after having spent five months during the summers of 1954 and 1955 in Germany doing research in blasting and consulting work with Rheeinische Kalksteinwerke Company, Wulfrath, Rhineland. Before World War II Mr. Kochanowsky was assistant to the president and general manager of the company. Later he worked in Belgium, France, and Switzerland, and after the war spent six years in Argentina as professor of mining engineering at the University of Cuyo.

J. J. Brummer has joined the staff of Kennco Explorations (Canada) Ltd. with headquarters in Quebec. Mr. Brummer formerly was chief geologist for Rhodesian Selection Trust (Services) Ltd. and Mufulira Copper Mines Ltd. in Northern Rhodesia.

John Hagen, senior exploration geologist for Hanna Coal and Ore Company, has been studying the Surigao iron and nickel reservation in the Philippine Islands which was recently put up for bidding by the Philippine Bureau of Mines. Hanna was invited by the Bureau to study the prospects of the reservation for its possible development. Hanna Coal and Iron is a subsidiary of M. A. Hanna Company.

William J. Rundle, formerly with the University of Wisconsin, has joined the staff of Cyprus Mines Corporation, Los Angeles, California. Mr. Rundle will be engaged in engineering work and administration of the corporation's mining properties on the Island of Cyprus and in other parts of the world.

Robert Shepherd, mining department head, London, England, and **C. H. Fritzsche,** head of the mining department, University of Aachen, Germany, were in the United States recently. Both men took part in a symposium on rotary drilling at the University of Minnesota and later toured mining operations on the Mesabi range. Dr. Fritzsche also visited potash operations in New Mexico.

W. H. Wamsley, mine superintendent, Pacific Coast Borax Company, Boron, California, and his wife have returned from a tour of Europe which included visits to mines in Germany and Scotland. They also stopped at the London, England offices of Pacific Borax's parent compny, Borax Consolidated, Ltd.

L. F. Mondolfo has been promoted to director of the department of metallurgical engineering at the Illinois Institute of Technology, Chicago, Illinois. Dr. Mondolfo came to the school in 1947 and before that time was associated with several United States companies as a research metallurgist.

Arnold H. Miller, consulting engineer, is on a tour of Spain, France, and North Africa where he is conducting mine examination work.

B. C. LANSING has taken over his new duties as general manager of the Tin and Associated Minerals, Ltd. columbium mine in Nigeria. He was formerly assistant pit superintendent of the Kennecott Copper Corporation's Ray Mines division in Arizona. Kennecott holds a 52 percent interest in the Nigerian tin and columbium producer. Tin and Associated Minerals holds mining leases over more than 5,000 acres in the Bauchi Plateau and Benue Provinces of northern Nigeria. Its mine offices are located at Jos.

MAURICE F. DUFOUR has been elected vice president of Nicaro Nickel Company, wholly owned subsidiary of Freeport Sulphur Company. Mr. Dufour, who has been associated with Freeport or its subsidiary companies in technical and executive capacities since 1933, will be in charge of the company's project to develop nickel and cobalt orebodies at Moa Bay on the northeastern coast of Cuba. In 1954 Mr. Dufour was named assistant vice president of Freeport. He had been manager of development since 1951.

Note the stringers of Stoody 21 which act as "buffers" between abrasive earth and bucket sides. Inside surfaces of bucket receive similar protection.

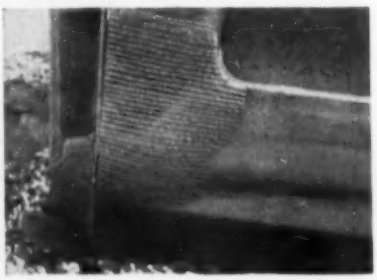
All Buckets Take a Beating... Here's the Medicine!

We're often asked about bucket maintenance, what hard-facing material to use and how to use it for maximum wear protection. Actually, your own equipment gives you part of the answer. Each bucket wears differently, depending upon how it is used and the kind of material handled. By watching for development of wear patterns, then hard-facing these areas at definite intervals, you'll get extended service with greatest economy. *Remember, a frequent touch-up is better than a major repair*...more economical in hard-metal and less costly in down time.

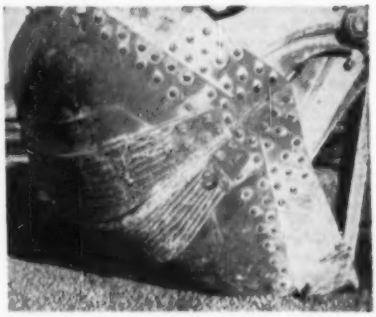
If buckets are severely worn, first build up with Stoody Manganese. For hard-facing, the alloy most commonly used is Stoody 21, preferred because of good wear resistance, fast deposition rate and low price. Occasionally, under conditions of excessive abrasion, Coated Tube Stoodite gives longer life on shovel teeth and reduces maintenance costs.

Full particulars on alloy recommendations and hard-facing procedures are in the Stoody HARD-FACING GUIDEBOOK. Ask your dealer for a copy (check the "yellow pages" of your phone book) or write direct.

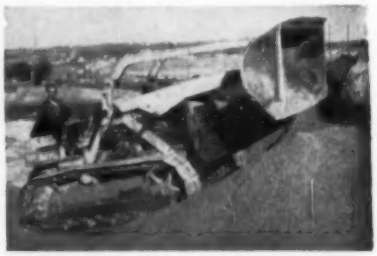
Bucket teeth (top illustration) and adapters (above) are amply coated with Stoody 21. Hard-faced teeth on this job averaged two full shifts of extra service before needing additional hard-facing treatment.



These Stoody 21 beads across the bucket resist severe abrasion as it is dragged across rubble, returning for a new bite.

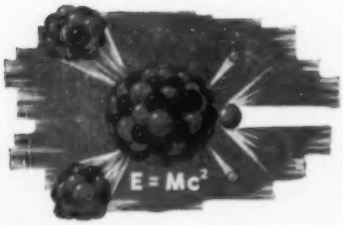


Lips on this clam shell are kept in good shape for a tight seal with Stoody 21.



Scoop lifts often lead a tough life. Here, lips, sides and bottoms are kept in good condition with Stoody 21. Occasional touch-ups are made as wear occurs.

STOODY COMPANY 11969 East Slauson Avenue, Whittier, California



FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Continental Uranium Gets La Sal Mill Contract

Continental Uranium, Inc. and the United States Atomic Energy Commission have signed a contract for the construction and operation by Continental of a uranium processing mill at La Sal, San Juan County, Utah. Construction is beginning immediately, with completion scheduled for July 1, 1956.

The La Sal mill will process uranium ore produced from properties owned, leased, or controlled by Continental, as well as uranium ores bought from independent producers. The company will also recover and retain ownership of vanadium in the ore. The AEC will buy the entire uranium concentrate output of the mill until July 10, 1962.

For the mill site Continental has leased 40 acres at La Sal near the northern edge of the Big Indian district. Continental and its subsidiaries operate two producing mines, the Continental No. 1 and the Rattlesnake mine in San Juan County.

The new mill brings to 14 the number of uranium processing plants in the western United States. Nine are operating and four are under construction. These include those of: Mines Development, Inc., Edgemont, South Dakota; Uranium Reduction Company, Moab, Utah; Rare Metals Corporation of America, Tuba City, Arizona; Trace Elements Corporation, Maybell, Colorado.

Bureau Report Describes Uranium Mining Methods

The first of a series of U.S. Bureau of Mines publications describing uranium mining on the Colorado Plateau has been released by the Department of the Interior. The report discusses in detail equipment and methods used in prospecting, exploration, development, and mining. It also quotes typical costs of many operations involved and includes brief descriptions of the Colorado Plateau.

Future publications in the series will discuss exploration, development, and mining methods and costs.

A free copy of I.C. 7726, "Uranium Mining of the Colorado Plateau," by W. L. Dare, R. A. Lindblom, and J. H. Soule, can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pennsylvania.

Uranium Exploration Underway by Oregon Firm

Metal Services, Inc., a Roseburg, Oregon exploration firm, has begun moving equipment onto its property in the Bear Creek area of Crook County, Oregon where autenite-type uranium ore has been reported. The claims are in the vicinity of recent uranium discoveries by Sage Hollow Mining, Inc., a Douglas County, Oregon firm.

Metal Services has been conducting exploration work for several months and is moving $300,000 worth of machinery into the area. United States Atomic Energy Commission geologists have already visited the property. The autenite ore is believed to be associated with rhyolite dikes that cut across the region.

Charles C. Williams, Lakeview, is geologist for the firm. A. H. Leaper, Roseburg, is president. The company also has holdings in Lakeview County, where uranium discoveries were reported last year.

Japanese Diet To Vote On Uranium Mining Law

An act to encourage the exploration and mining of uranium and thorium has been submitted to the Japanese Diet by Japan's Bureau of Mines. The measure calls for the two minerals to be classed as "legal mineral ores" under the current mining law and would go into effect February 1. Renewal of the act would be necessary in five years.

The legislation is an outgrowth of the recent United Nations International Conference on the Peaceful Uses of Atomic Energy held in Geneva, Switzerland. It has been approved by the Japanese cabinet and needs only congressional approval for passage.

Happy Jack Mine Sold for Record $30,000,000

National Mining and Milling Corporation, a newly formed company of New York, California, and Arizona interests, has acquired Barlu Oil Company's option to purchase Cooper and Bronson's Happy Jack uranium mine, reported to have one of the largest and highest grade ore bodies on the Colorado Plateau. Barlu, a Dallas, Texas oil firm, first secured the option for an estimated $30,000,000 and then reassigned it to the new group, which includes Foley Brothers, Inc.; former United States Ambassador to England, Lewis W. Douglas; and Edward Simmons, California oil operator. A down payment of $10,000,000 will be made, with the remainder of the $30,000,000 being paid out over a 10-year period. Pictured above is an aerial view of the property, which is located in White Canyon, 16 miles south of Hite, Utah. Arrow points to the mine portal, located on the contact between the Moenkopi and Shinarump formations on the western side of the canyon. Workings consist of a number of drifts and crosscuts (the most advanced drift face is approximately 1,800 feet almost due south of the mine portal). Main haulage road leads to the U.S. Atomic Energy Commission buying station ½-mile to the west. Access roads throughout the claim group are visible and reach as high as the Chinle in the area immediately southeast of the workings. Mine camp is in the lower right-hand corner of the photo. The mine was purchased by Fletcher Bronson, Grant Cooper, and Joe Cooper in 1946 as a copper prospect for $1,000. The owners began developing the property as a uranium mine in 1948 when the federal government announced its buying program. Geologists have estimated that the mine contains 1,500,000 tons of ore valued at $52,000,000. In negotiations for the sale of the Happy Jack, the Cooper-Bronson interests were represented by T. R. Gillenwaters, president of Uranium Engineering Company, Grand Junction, Colorado, who also acted as agent for Floyd Odlum in the $10,000,000 purchase of Vernon Pick's Delta mine two years ago.

It Takes Precise Feed Control To Drill More Footage Per Shift

. . . the 11-position feed control in Le Roi-Cleveland Air Legs makes drilling faster . . . easier

Superb feed control is built into Le Roi-Cleveland Air Legs. The 11-position feed control eliminates a third hose, and cumbersome "Y" connections. Operators can set and maintain feeding pressures from 9 PSI to full line. This permits faster, easier drilling . . . more footage per shift.

When you use Le Roi-Cleveland Air Legs, all drilling is done in line with the hole. Front-end drill wear is reduced . . . rotation strain is practically eliminated, for reduced repair costs.

Le Roi-Cleveland Air Legs not only support the drill and feed it into the rock, but also absorb recoil. This makes the job of drilling easier for your miners, reduces fatigue, increases safety.

You get a lot of versatility with Le Roi-Cleveland Air Legs, too. You can use them as stopers, drifters, and sinkers. They have a full range of drill rotations. Moreover, they are easy to move around. A bayonet-lock permits quick dismantling for easy transportation.

Choose from three types of Le Roi-Cleveland Air Legs having conventional or telescopic 3-ft., 4-ft., or 5-ft. feeds.

Write today for complete information.

RO-76

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

22-ton "Eucs" with quarry bodies haul stone for Ideal Cement Co. of Colorado. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic Drive are important factors in stepping up production and profits at this operation.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Higher Availability
More Tonnage
Lower Costs

On scores of mine and quarry operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the metallic and non-metallic mining fields. If you're interested in cutting your hauling cost for ore, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

Rear-Dump models are available in 10, 15, 22, 34 and 50 ton capacities with engines of 165 to 600 h.p. . . . semi-rigid or spring mounted drive axles . . . standard transmissions or Allison Torqmatic Drives.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Great Lakes Ore Shipments at Peace-Time High; Foresee Price Rise and Western Export to Japan

By J. M. TAYLOR

News Editor

Despite a late start this past season, the Lake Superior Iron Ore Association reported record peace-time shipments of iron ore on the Great Lakes during 1955.

As of December 6, with only a few cargoes yet to be received, the season's total stood at 87,419,645 tons. This is the highest peace-time figure recorded, and less than 9,000,000 tons under the all-time high of 95,844,499 tons set in 1953.

Most mining companies are looking forward to an even better season in 1956, as steel demands continue at a peak. Actual ore tonnage, however, may not be as high since a part of future production will be in taconite pellets which contain more iron units per ton.

Stronger demands for iron ore, coupled with incerased production and transportation costs, are expected to bring a price increase for iron ore during this next season. Already selling at $10.10 per ton, the increase may be as much as 10 percent. This higher price will make many presently small and inaccessible deposits mineable, and it can be expected that sources other than the Iron Ranges of Minnesota and Michigan may be developed during this coming year. A newcomer already announcing plans for the new season is the Young-Montana Company which expects to mine between 75,000 and 100,000 tons of ore annually from holdings 75 miles southeast of Great Falls, Montana. (See complete story about this new firm on page 89 of this issue.)

Western iron mines will also be busy during 1956—first to supply western blast furnaces, and then for export. The J. R. Simplot Company has already reopened its iron mining operations in Eureka County, Nevada for exports to Japan. The firm expects to ship about 2,000 tons of ore daily from Modarelli deposit near Paradise, from which it shipped over 300,000 tons in 1952.

Japanese iron and steel manufacturers increased their original production goal for 1955 from 4,600,000 tons to 5,100,000 tons, causing a considerable mix-up in their supplies of iron ore. This necessitated an emergency purchase of about 270,000 tons of iron ore by spot purchase, and 920,000 tons on a long-term contract, with the bulk coming from mines in the western United States. About 200,000 tons of the 270,000-ton spot purchase were to be delivered by December 31, 1955, and it is hard to predict at this writing whether these goals will be met.

Breakdown of emergency purchases is as follows:

Spot Purchase

Source	*Contracted Amount (tons)*	*Amount Expected By Dec. 31, 1955*
Texada, British Columbia	30,000	30,000
Utah Construction Co. (Cedar City, Utah)	50,000	50,000
Kaiser Steel Company (Eagle Mountain, Calif.)	100,000	80,000
Itabira (Brazil)	20,000	20,000
Chile	27,000	None or 9,000
El Pao (Venezuela)	6,500	None or 6,500
Port Lady (India)	40,000	20,000
Total:	273,500	200,000 (Approx.)

Long-Range Contract

Source	*Contracted Amount (tons)*	*Amount Expected By End of 1955*
Texada, British Columbia	220,000	70,000
Standard Slag Company (Wabuska, Nevada)	35,000	200,000
Kingstone (U.S.)	350,000	10,000
Total	920,000	280,000

4,000-Ton Plant Scheduled For Sipalay Copper Mine

Marinduque Iron Mines Agents Inc. has approved plans to erect a 3,000- to 4,000-ton concentrating plant at its Sipalay copper mine in Negros Occidental, central Philippines. Stockholders of the company recently approved an increase in capital stock from 2,000,000 pesos to 10,000,000 pesos to raise funds for financing the installation of the mill. Development work at the mine has produced 9,100,000 tons in positive and probable ore with an average content of 1.0 percent copper. Present work indicates that much more additional tonnage can be developed. (See MINING WORLD, September 1955, pages 62, 63).

Part of the funds to be raised from the new stock will also be used to finance development of the Bagacay iron-copper deposits in Samar, which the company acquired last year. (See MINING WORLD, October 1955, page 75.) Preliminary work on the property disclosed ore reserves of more than 5,000,000 tons with assays ranging from 51.27 percent to 59.81 percent iron. The work also revealed some 35,000 tons of copper shale ore with an average content of 10 percent copper.

It is the plan of the company to mine the carbonaceous shale deposits by open-pit methods and to ship the ore to Japan for concentration until the company has a mill of its own.

On other areas of the Bagacay copper deposits, assays ranging from 5.34 percent to as high as 47.09 percent, have been obtained. The company's present program of development work involved diamond drilling and cutting trenches to expose all areas along the contacts of the ore bodies uncovered in order to define the size and extent of mineralization.

100-Ton Plant Completed For Mexican Mercury Firm

A 100-ton flotation plant has been completed on the property of Mina La Marina at Huitzuco, Guerrero, Mexico by Maquinaria Minera e Industrial S.A. The new mill will enable Mina La Marina to treat low-grade ore and to take advantage of the present high prices of mercury.

Huizuco has been a mercury producer for many years, with production rising and falling in keeping with the world price. The mercury in the district occurs mostly in the form of Livingstonite, a combined mercury and antimony sulphide in combination with cinnabar and stibnite.

The mill is designed to follow a standard flow sheet, with single-stage crushing through a Rogers jaw crusher. Ore is ground in a standard ball mill classifier grinding circuit, and the combined mercury-antimony pulp is then floated in a standard flotation circuit preceded by conditioning. Concentrates pass to a thickener and drum filter prior to subsequent treatment.

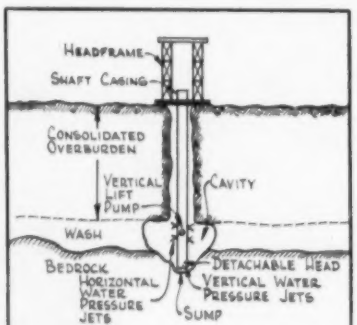
The new flotation plant will enable Mina La Marina to greatly increase its capacity. Before the new plant, only high-grade ore was burned in Mexican furnaces consisting of 8-inch iron pipes heated by charcoal fire with the mercury passing to a condenser. Not only are these furnaces inefficient, but they also do not recover the antimony.

Ribon Valley Building Jet Mining Plant In Nigeria

Ribon Valley (Nigeria) Tinfields, Ltd. plans to have its new pilot-scale hydraulic jet mining plant in operation by mid-year on its Sabon Gida tin-columbite properties in northern Nigeria.

The new plant, termed the Karl Wildi, has already been successfully operated in Switzerland for the recovery of sand and gravel from underwater lake beds. Ribon Valley has acquired a 50 percent interest on the Karl Wildi plants from Mr. Wildi, the inventor, of Berne.

The accompanying diagram shows how the new plant works in ground where it is suitable for operation. A small shaft is sunk through the unpayable overburden, which lies above the mineralized 'wash,' by means of water pressure jets.



The shaft is lined with steel casings, the first casing containing a detachable head in which vertical and horizontal water pressure jets are located. Above this head a vertical-lift gravel pump is mounted. The jets disintegrate the ground in sinking, the pulp being pumped to the surface. Further casings are added as required. When bedrock is reached, a sump is cut, the vertical jets closed, and the horizontal jets opened to excavate a cavity around the shaft, the height of which depends on the thickness of the 'wash.' Excavated matter is pumped to the surface.

Indian Steel Expansion Contract to U.S. Firm

An agreement for the design, procurement, and construction of a $130,000,000 steel plant expansion at Jamshedpur, India, has been signed between The Tata Iron and Steel Company, Limited, and Kaiser Engineers Division of Henry J. Kaiser Company.

The project, which is one of the largest steel plant construction jobs ever awarded a United States firm, will increase India's current steel capacity by approximately 45 percent and raise the Tata plant's production from about 1,300,000 to 2,000,000 ingot long tons annually. The job will require the purchase of approximately $50,000,000 worth of machinery and equipment and is scheduled to take only 30 months' time.

The expansion, providing new integrated facilities all the way from raw materials handling through finished steel, will include additional coking facilities, including a new 26-oven battery of coke ovens and a by-product plant; a sintering plant incorporating crushing and screening facilities with a capacity of 4,000 tons per day; a new 28-foot diameter blast furnace; additional open hearth furnaces; a 46-inch blooming mill; a medium and light structural mill; and a continuous sheet bar mill.

Australian Rutile Mining Expands to West Coast

The Australian Bureau of Mineral Resources estimates that world production of rutile in 1954 totaled 52,000 tons, 44,000 tons of which came from Australia. It is also estimated that by 1960 Australian output may be required to rise to 88,000 tons of rutile to meet indicated demand. This demand, coupled with recent high prices, has encouraged many Australian firms to develop areas long known to contain ilmenite, rutile, and zircon.

A concentration and separation plant has been built by Zircon Rutile Ltd. 30 miles north of Byron Bay and a complete unit will also be constructed at Port Macquarie. Titanium Corporation of Australia, in which Zircon Rutile holds a 50 percent interest, has been formed to work deposits at Tewantin, Queensland, and is expected to be in production during 1956. These projects are in addition to the Byron Bay unit where operations have been maintained for over 21 years.

In Western Australia, Western Titanium has been formed by Commonwealth Mining Investments, Ltd. and Aberfoyle Tin N.L. to take over beach areas held by the Fetiolite Syndicate at Capel between Bunbury and Busselton. More specifically, these deposits are at Minninup near Bunbury, Wonnerup near Busselton, Cheyne Bay near Albany, and Doubtful Island Bay not far from Cheyne Bay. All have much lower rutile and zircon content, but higher ilmenite content than the Australian east coast deposits—about 5 percent rutile and 10 percent zircon in the heavy mineral fraction, compared with up to 33 percent of each in the heavy mineral fraction on the east coast. Somewhat offsetting this is the fact that the Western Australia ilmenite is sufficiently low in chrome to make it suitable for use in the making of titanium pigment, whereas the east coast ilmenite is too high in chrome.

A plant is planned which will be able to treat about 125,000 tons of beach sand annually. Present indicated reserves are good with current estimates placed at 8,000,000 tons, or enough for about 64 years of operations. Estimated output would be 49,875 tons of ilmenite, 697 tons of rutile, 150 tons of monazite, and 135 tons of ferruginous rutile.

Atlas Plans Expansion To 10,000 Daily Tons

Colonel Andres Soriano, president of Atlas Consolidated Mining and Development Corporation, has announced formal approval of the Board of Directors for expansion of Atlas' Toledo copper flotation mill to 10,000 daily tons by the last quarter of 1956. Average daily tonnage in November 1955 was 4,800 tons with three days of no operation because of a typhoon. The first stage of expansion to 6,000 tons was completed late in 1955. Atlas' November output was 1,409,923 pounds of copper and 496.7 ounces of gold in 3,281 dry short tons of concentrate.

Canadian Firm to Deliver Iron Concentrate to Japan

Texada Mines, Ltd., British Columbia iron producer, has signed a new contract with Japanese steel companies for sale of magnetite concentrate. Approximately 250,000 tons will be shipped in the next eight months, but no total figure was given.

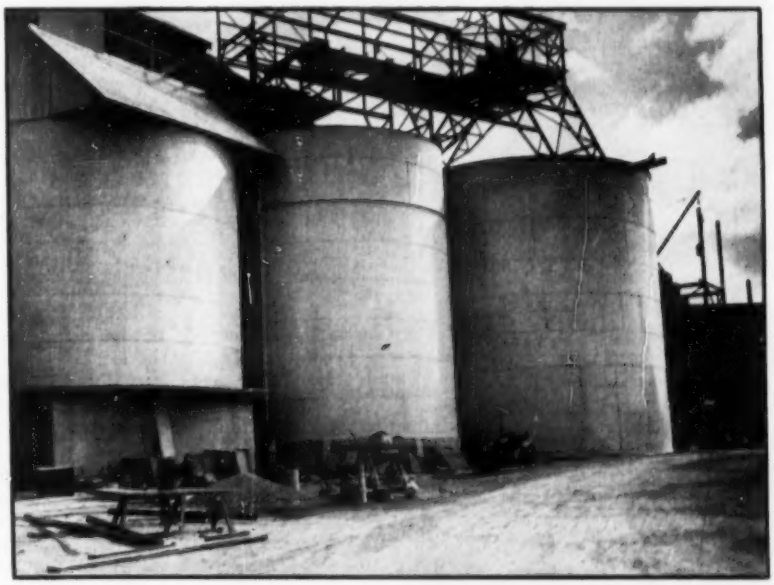
To fulfill the new commitment an open-pit mine, the Yellow Kid, is being opened to the north of the original Texada mine, which is on Texada Island some 60 miles northwest of Vancouver.

In 1952 Texada signed a 1,000,000-ton contract with Japanese steel mills. When this was completed, the Canadian firm delivered 100,000 tons of concentrate to West German manufacturers. This latter contract has recently been fulfilled.

Pickands Mather To Join In Canadian Iron Venture

Construction is scheduled to begin early this year on a $16,000,000 iron mining project north of Hull, Quebec, Canada, which was recently announced by Pickands Mather & Co., Cleveland, Ohio, and Steel Company of Canada. An operating company, to be known as Bristol Quebec Mining Company, Ltd., is being formed by Pickands Mather. It is believed that Jones & Laughlin Steel Corporation will also have an interest in the operation.

Ore reserves are reported to be large enough for a 600,000-ton annual production for the next 15 to 20 years. A $12,000,000 processing plant and three-mile railway link to the Canadian Pacific Railway will be built. A high-grade concentrate of about 66 percent Fe will be produced at the plant. Completion date is set for late 1957.



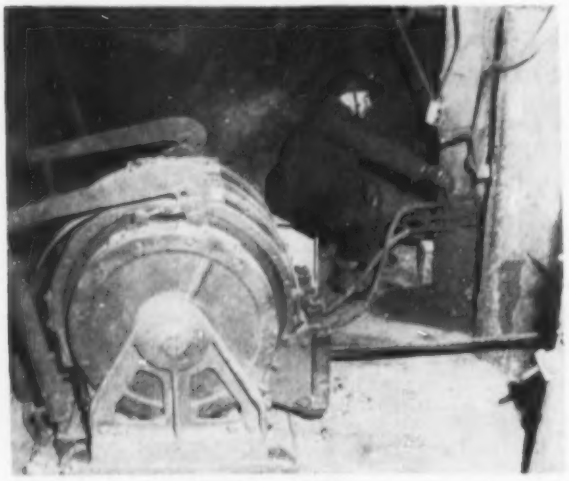
Gold Mines of Kalgurli Expands Mill Capacity

Gold Mines of Kalgurli in Western Australia has expanded its mill to treat 38,000 tons of ore per month, and the new section is now in operation. Shown above are the new 2,000-ton capacity ore bins which were also installed on the property, along with a 120-foot-diameter thickener. Gold Mines of Kalgurli has acquired the shares of South Kalgurli Consolidated, Boulder Perseverance Ltd., and Kalgoorlie Enterprise Mines during the past year, and output from these combined mines will supply the new mill. Most recent to agree to proposals to merge their company's interests with G.M.K. are the shareholders of New Coolgardie N.L. Mergers of this kind by companies with adjoining areas are expected to help lower operating costs.

Sullivan Mine Uses Four-Way Valve for Remote Control of Slusher Hoists

The use of remote controls for slusher hoists is not a new idea as several manufacturers supply hoists so equipped. The most common type employs air cylinders instead of manually operated levers to tighten the clutch bands and then a control device, which can be located at some distance from the hoist, to operate the cylinders.

One of these hoists was purchased at the Sullivan mine of The Consolidated Mining and Smelting Company of Canada Limited at Kimberley, British Columbia, but the control mechanism supplied with it gave considerable trouble. Mechanical failures, which interrupted production and added to maintenance costs, were frequent. It was not until the use of a simple four-way valve was suggested as a control that the operation of this hoist by air-cylinder became satisfactory.



FOUR-WAY AIR VALVE simplifies remote control of this slusher hoist.

The four-way valve control (see photograph) feeds compressed air to either of the cylinders while exhausting the other. The air forces the pistons upward tightening the clutch bands. Downward travel takes place when the cylinders are opened to exhaust. Lead weights, attached to the pistons inside the cylinders, assist this downward motion. Coil springs were tried for this purpose but did not prove satisfactory.

The operation of hoists with these simple controls has proved so efficient that most of the larger hoists at the Sullivan have now been equipped with them.

Pressure Burst Survey May Increase African Mine Life

The Council for Scientific and Industrial Research in The Union of South Africa, reporting on pressure bursts in mines, comments that one of the most serious problems faced and to be faced by the Witwatersrand gold mines is the increasing number of rock bursts encountered as mining operations are conducted at greater depths. Unless this problem can be solved, it may prove a limiting factor in the depths to which mines can eventually be worked. In several mines there is strong evidence that the gold content of the reef increases with greater depth. Therefore, it would be profitable to mine the ore from the deeper levels, down to 12,000 feet, if pressure bursts could be avoided. A research division of the Council recently undertook a preliminary investigation of the problem under contract with one of the large mining groups. Such promising progress has been made that the group has now renewed the contract and made more funds available to enable the work to be continued and at an increased rate.

A pressure burst is not merely a fall of hanging wall rock, but can take place in any direction and appears to be more violent at greater depths. One of the more serious bursts studied recently by the research division involved a sudden upward movement from the footwall at the working face over an area of 240 by 50 feet. An estimate of the energy involved in this particular burst amounts to $1{,}050 \times 10^6$ foot-pounds released over a fraction of a second. In one of the mines working at a depth of 8,500 feet, the number of rock bursts now average from 10 to 15 a month, involving monthly losses conservatively estimated at between £7,000 and £10,000. Though not all the mines are as bad as this, the losses in the district are considerable; even a partial solution of the problem would result in substantial savings, quite apart from the possibility of extending the profitable life of the mines by enabling them to be worked at greater depths.

BELGIUM—The plant now under construction by *Societe Generale Metallurgique de Hoboken* at Olen is expected to make the company one of the most important germanium producers in the world. In addition to recovering germanium oxide from flue dust of *Union Miniere du Haut Katanga's* copper-zinc smelting operations in the Belgian Congo, Hoboken has an agreement to recover germanium from concentrates of *Tsumeb Corporation, Ltd.*, Southwest Africa. (See MINING WORLD, January 1955, page 66.)

AUSTRIA—*Franz Mayr Melnhof & Co., Grafitbergbau Kaisersberg*, Austrian graphite producer, plans to begin production shortly at its new chemical plant which is designed to increase the grade of its flotation concentrate from 92 percent to 99 percent carbon. The company has conducted extensive research in floating microcrystalline graphite, and its mines are among the largest graphite deposits in Europe.

NORWAY—*Norsk Jernverk A/S* estimates that its 1956 production will reach 200,000 tons of pig iron and 180,000 tons of crude steel. Output for 1955 was approximately 50,000 metric tons of iron and steel. The company recently received its first order for export to the United States—2,000 tons of rolled steel. Norsk Jernverk is operator of the *Mo i Rana* steel plant.

BELGIUM—Iron ore imports from Sweden are expected to be 1,000,000 tons greater than those of 1955. The increase is accounted for by the present high production level of the Belgian iron and steel industry.

AUSTRIA—Ore production figures for the first half of 1955 show a general increase over the same period of 1954. The only decline in output was noted in copper. A summary of production figures for the two periods follow:

Commodity	First half 1955*	First half 1954*
Iron ore	1,392,949	1,303,901
Lead-Zinc ores	68,301	60,899
Antimony ore	5,064	4,736
Bauxite	8,184	7,006
Raw magnesite	478,550	402,385
Copper ore	82,265	85,219

*Metric tons

SCOTLAND — *Mitchell Construction Company* crew members have made a new world record for rock tunnelling at the *North of Scotland Hydro-Electric Board's* project at Breadalbane, Perthshire. In seven days 557 feet of tunnel were driven in schistose granite at the St. Fillans No. 4 tunnel. Mitchell achieved a previous record at the Breadalbane project in the early part of 1955. (See MINING WORLD, March 1955, page 67) *Marples Ridgeway and Partners, Ltd.*, working at the *Allt-na-Lairige* project, later broke this record by driving 429 feet in one week. (See MINING WORLD, July 1955, page 77) The attempt to set the current record started October 20, 1955 with teams of nine men at the face of the 8-foot, 6-inch wide tunnel with two supplementary teams of seven working eight-hour shifts. By October 27 they had achieved 88 cycles with an average pull of 6 feet, 4 inches per cycle.

ITALY—Mercury exports during the first nine months of 1955 totaled 643 tons. During the same period of 1954, 1,775 tons were exported.

NORWAY—During the first half of 1955 4,501,000 tons of iron ore were shipped from Narvik. In 1954 4,230,000 tons were shipped during the same period.

ITALY—*Engelhard S.p.A.* has been incorporated in Rome with a capital of 100,000,000 lire for research and processing of uranium and precious metals. Gordon V. Richdale is president of the new corporation.

ENGLAND—*Canadian Aero Service Limited* of Ottawa, Canada, is making a 10,000-square-mile aerial survey in the Midlands area of England. This is the first large-scale airborne magnetometer survey to be conducted in Great Britain. Primary purpose of the survey is scientific investigation, rather than the discovery of new mineral resources, and is being financed by the *Nuffield Foundation*. The test is being administered by the *Department of Scientific and Industrial Research* through the *Geological Survey of Great Britain*.

WEST GERMANY—A levy on pig iron and rolling mill products has been agreed upon by the steel industry to finance import of United States coal.

ALBERTA—*Sherritt Gordon Mines Ltd.*, already operating at a rate of 17,000,000 to 18,000,000 pounds of nickel annually, is planning to increase its production another 10 percent. Capacity operation was reached last summer. Earlier in the year, the Fort Saskatchewan refinery had had mechanical difficulties because of errors in equipment installation. The plant operated throughout the third quarter with 40 to 50 percent of the feed coming from stockpiled concentrate built up in 1954. Production at the *Lynn Lake* mine was at about the same rate during the second and third quarters of the year.

ILLINOIS—During the past year the Mining Section of the National Safety Council conducted a national campaign with a goal of 50 percent reduction in injuries and fatalities resulting from falls of ground accidents in mines. During the first six months of the campaign, Canadian mines had an average reduction of 33 percent. Mines in British Columbia achieved the largest average reduction—42 percent. In the United States, the average improvement was 19 percent. Idaho and the area of New York, Pennsylvania, Ohio, Virginia, and New Jersey had an average reduction of 41 percent in the frequency of injuries. Any underground mine, except coal, could enter the campaign provided it had 25 or more employees working underground.

ALASKA—*Moneta Porcupine Mines* and *Buffalo Ankerite Gold Mines* will undertake joint development of their mercury property 17 miles from Dillingham. Preliminary work during the past season was handled for them by a contractor. Next season's work will be done under their own management, including installation of a plant. Sampling so far has indicated high-grade mercury shoots. An adit driven 160 feet intersected two veins about 30 feet apart. Moneta owns 70 percent of the operation and Buffalo the remaining 30 percent.

ONTARIO—*Wright-Hargreaves Mines* will deepen its No. 5 internal shaft in the Kirkland Lake gold district from the 7,200-foot level to a depth of 7,900 feet. The decision was made after encouraging drill results at depth, and after *Lake Shores Mines*, which adjoins Wright-Hargreaves, had success in development to the 8,075-foot level. Completion of Wright-Hargreaves workings will make them the second deepest in North America.

BRITISH COLUMBIA—*Salmo Prince Mines, Ltd.* has taken a long-term purchase agreement on a copper property two miles from Greenwood in the old *Greenwood-Phoenix* copper camp. The property adjoins the old *Motherlode* mine which is being diamond drilled by *Surety Oil & Minerals Company Ltd.* Diamond drilling of a flat-bedded ore body is being arranged by B. I. Nesbitt, consulting geological engineer and managing director. R. T. Blackmore is president.

BRITISH COLUMBIA — *Telemac Mines Ltd.* and *Dog River Mining Company Ltd.* are jointly developing two lead-silver mining properties in the Cassiar area of northern British Columbia. In addition to a total of 27 base metal claims, the companies own a 75-ton mill and mining equipment including a 2,200-foot aerial tramway. Work on the properties in 1955 season opened up three ore showings, and samples were shipped to the *American Smelting and Refining Company* smelter at Helena, Montana for analysis. Two diamond drills equipped to explore to 1,100 feet have been placed on the properties ready for a detail subsurface program in 1956. An 800-foot chute and sacking shed have been constructed for resumption of operations in early spring.

ALASKA—*Clayton Exploration Company* of Minneapolis, Minnesota has optioned an old gold lode property at Bluff, Alaska, and examinations are being carried out. If sampling results are satisfactory, development work would begin next spring.

QUEBEC—More iron ore than previously suspected is now being developed on the 40 square miles of property of Oceanic Iron Ore of Canada Limited in the Ungava region, just south of Payne Bay. Under the direction of Dr. A. T. Griffis, a team of 20 geologists, engineers and technicians conducted an extensive program of diamond drilling, surface exploration, mapping and topographical surveying during this past season. In addition, a complete aerial prospecting program was carried out using magnetic, electromagnetic, and scintillometer techniques. Dr. Griffis' ground party confirmed by diamond drilling, that there are 250,000,000 tons of 25 percent to 30 percent iron material in a small portion of the Morgan Lake range.

ALASKA—The *U. S. Geological Survey* has announced the location of a number of radioactive anomalies in interior Alaska. The radioactive responses were graphically recorded while flying at an elevation of about 100 feet and at a speed of 80 miles per hour. A 4-inch scintillation crystal was used. None of the anomalies have been checked on the ground and the Survey warns that these data only suggest favorable locations for further prospecting. The maps may be consulted or purchased at the U.S.G.A. offices in Fairbanks, Anchorage, and Juneau.

REPUBLIC OF THE PHILIPPINES—*Hanna Coal and Ore Company* is exploring the possibilities of the *Surigao* iron and nickel reservation put up for bidding recently by the Philippine Bureau of Mines (see MINING WORLD, November 1955, page 68). If the deposits appear favorable, the company will make a bid for the lease on the reservation. Prospects look promising, according to John Hagen, senior exploration geologist for Hanna, who is now in the Philippines. He reports that the rocks at the reservation were the same as those found in the company's nickel mine at Riddle, Oregon.

SOUTH AUSTRALIA—The South Australian government will permit private interests to establish a uranium mine not far from Radium Hill at Mount Victoria Hut, north of the railway line to Broken Hill. The State Mines Department has proved an ore body of economic size there. *Western Mining Corporation Ltd.*, whose gold interests are wide-spread in Western Australia, is believed interested in the Mount Victoria Hut deposit. At the height of the uranium prospecting boom, Western Mining expressed interest in obtaining a worthwhile uranium deposit and carried out certain prospecting work near Cloncurry, Queensland, without establishing worthwhile reserves.

REPUBLIC OF THE PHILIPPINES—*Palawan Consolidated Mining Company* reports that diamond drilling and extensive pitting have uncovered and proven two ore bodies so far on its property in Puerto Princesa, Palawan. The company was formed in July 1955 to develop chromite and quicksilver properties (see MINING WORLD, November 1955, page 74.) One of the two ore bodies is said to consist of about 50,000 tons of metallurgical grade chrome. A short distance away is the other ore body on which initial development work has produced some 20,000 tons of metallurgical grade chrome.

QUEENSLAND—*Mount Isa Mines Ltd.*, Mount Isa, milled 53,400 tons of copper ore in October for 1,570 tons of blisted copper (usually 2,000 to 2,300 tons per month). The company is reportedly considering erection of its own electrolytic copper refinery near the Queensland coast. Meanwhile, some blister is being refined in the United States and returned to Australia, while the remainder is refined at Port Kembla, New South Wales. There are signs that Australia's copper production and consumption are approaching a state of balance and that imports of copper will no longer be necessary. If Mount Isa and other producers considerably increase their outputs, as seems possible, Australia will definitely have copper for export. Present total output is running at the rate of 45,000 tons per year. The Mount Isa company has just reported a record profit of over £3,000,000 (more than 50 per cent on capital). Much of this is due to copper. Lead output continues at the monthly rate of 3,500 tons of base bullion, while zinc concentrates are 2,500 to 3,000 tons per month.

NEW CALEDONIA—The Norwegian firm of *Elekstrokemish, A.S.* has signed a contract with *Le Nickel* for delivery of four smelting furnaces to the latter's nickel smelting operations at Noumea, New Caledonia. The contract is valued at about 10,000,000 Norwegian Crowns.

NORTHERN TERRITORY — *Australian Uranium Corporation N.L.* has now delivered 500 tons of ore to Rum Jungle. Development is being carried out through a number of shafts at Adelaide River and construction of bins, buildings, and access roads is proceeding. Rum Jungle concentrator has shipped its first flotation copper concentrates and cement copper to the custom smelter and refinery at Port Kembla, New South Wales.

INDONESIA — Negotiations between Japanese and Indonesian industrialists have resulted in a joint declaration concerning the mining industry. Both parties agree that they will strive to promote the export of Indonesian mining products and to expand the possibilities of developing mines in cooperation. The declaration urges the Indonesian government to

give the national managers ample opportunity to export vital mining products which presently is in foreign hands. Furthermore, the government is asked to give Japanese industrialists an opportunity to conclude contracts with the Indonesians. The Indonesian government is invited to pass a national mining law as soon as possible so that cooperation can take place, either in the form of joint companies, or as loans, and so that experts for technical assistance can be obtained to promote the development of the national mining law. In turn, the Japanese government is requested to provide opportunity for cooperation between Japanese and Indonesians on a legal basis.

REPUBLIC OF THE PHILIPPINES –The Department of Commerce reports that gold or chrome ore may be allowed for straight barter transactions under the "no-dollar" import law if the ore is produced at marginal cost or it has no available dollar market. Recent legislation provides that permits for straight barter transactions will be limited strictly to exports of agricultural, forestry, mineral, industrial, and other commodities produced locally that cannot be sold for dollars because of their grade, quality, or marginal production. Proof of the non-availability of dollar market or marginal cost of production is required before barter of these products will be permitted.

NORTHERN TERRITORY–*Uranium Development and Prospecting N.L.* is undertaking a comprehensive underground exploration program in its South Alligator River area. Eight surface prospects on a promising geological line will be tested by wagon drilling and, where necessary, by diamond drilling and shaft sinking.

NEW GUINEA–*New Guinea Gold and Petroleum Development N.L.* reports that it has found quartz, porphyry, and intersected quartz leaders and veins "running in all directions" in its area. The discovery was made in the second of two cuttings through rough rock adjoining Enterprise No. 12. Samples weighing 450 pounds yielded, on pan treatment, 23 ounces of gold. No estimate has yet been made of the size of the ore body.

REPUBLIC OF THE PHILIPPINES– Regulations governing the exploitation and development of the white clay reservation covering about 9,800 hectares in Siruma, Camarines Sur, have been released by the Agriculture Secretary Salvador Araneta. The clay deposits, raw materials for the manufacture of ceramic products, are made available for development through public bidding. The agriculture department, as administrator of the reservation, may enter into contract of services for the development of the area. "We need to tap every possible source of national wealth to help support the nation's economy," Araneta said.

AUSTRALIA–The Tariff Board has recommended against assistance for the asbestos fiber producing industry. *Australian Blue Asbestos Ltd.*, operating at Wittenoom Gorge, Western Australia, (a subsidiary of *Colonial Suger Refining Company, Ltd.*,–one of Australia's biggest industrial organizations) had asked for a 40 percent tariff on imported grades of asbestos fiber of certain lengths. Manufacturers of asbestos goods opposed the application.

SOLOMON ISLANDS–A gold-bearing ore body has been discovered on the Gold Ridge in the Guadalcanal Mountains. Exploration by means of tunneling and deep trenching is being carried out by the *Balasuna Syndicate*. This is the fourth gold-bearing ore body to be discovered on Gold Ridge this year by the geological survey. A light portable drill unit has been ordered from Canada, and the survey group plans to carry out a scout drilling program on all gold-bearing areas in the Gold Ridge field which measures two miles by one mile in area.

LATIN AMERICA

SURINAM–*Aluminum Company of America, Kennecott Copper Corporation*, and the *Reynolds Metal Company* are negotiating with the government for a contract to construct an aluminum plant with an initial capacity of 40,000 tons per annum. This would require about 160,000 tons of bauxite. The electric power for the plant would be generated by a new hydroelectric plant to be constructed on the Surinam River at Brokopondo. Total cost of the dam, hydro plant, and additional works is estimated at £16,000,000 to £17,000,000. The hydro project would be constructed by the government with borrowed funds and would take about six years.

CUBA–*Jauregui Mines* in Oriente Province has made its first shipment of iron ore to Western Germany. According to one of the owners, Luis Alonso Valdes, there is a possibility of a 600,000-ton contract, to be shipped in 10,000-ton monthly lots. This first shipment totaled 4,000 tons.

BOLIVIA–A New York firm, *Ford, Bacon & Davis*, will make an engineering-management survey of Bolivian mining to determine how the industry can make maximum contribution to the country's economy. Under a $162,000 contract financed by the International Cooperation Administration, the firm will send six technicians to Bolivia to study all phases of the industry, including mining, milling, smelting and refining, reserves, operations, management, capital requirements. Geological field surveys to explore and develop new mineral resources will not be included.

VENEZUELA–*Pacific Tin Consolidated Corporation*, a United States firm, is reported to be negotiating with the Ministry of Mines to start production in its *Gran Sabana* diamond concessions. Dredging of the alluvial deposits is under consideration.

PERU–The Mining Bank has inaugurated a new concentrator at Huarochiri, making five concentrators the Bank has in operation. The new concentrator has a capacity of 70 tons per day, but can be increased to 150 tons. During the past year the Bank has increased capacity of all of its plants from 450 to 1,000 tons per day.

PERU–*Cia. Minera Chapi* will undertake large-scale development of oxidized

copper deposits later this year with the completion of a 50-ton-per-day leaching plant. The Chapi deposits are located about 65 kilometers southeast of Arequipa at 8,530 feet above sea level, and have been worked for the past 30 years by hand picking methods. It is estimated that some 40,000 tons of hand picked ore averaging between 15 and 40 percent copper have been exported. The prospective deposits are estimated at over 1,000,000 tons; proved and probable deposits are about 80,000 tons of 3.5 percent copper.

MEXICO—Production of copper, zinc, and lead decreased during the first eight months of 1955 despite the steady upswing in prices. In August production in metric tons was: copper, 3,108; zinc 16,600; and lead 20,000. This compares with January figures of 4,940, 18,000, and 26,000, respectively. The Confederation of Chambers of Commerce declares that the unusually heavy torrential rains, provoking floods in many regions, were largely responsible for the strange decrease at a time when output should have been expanding. The water, says the Confederation, made movement of ore from mines to the nearest trunk road or closest railroad station very difficult, or at times impossible.

CHILE—The *Anaconda Company* has applied to the Copper Department of the Chilean Ministry of Mines for permission to import machinery, spare parts, and other supplies to further copper development. Value of the proposed imports is set at $38,000,000.

BRITISH GUIANA—*British Guiana Consolidated Goldfields* states that there are no economic deposits of columbite in the Rumong-Rumong to justify an extensive exploration and development program, and that, consequently, they have given up the exclusive permission they held to explore the area.

MEXICO—The Ministry of National Economy has granted the National Mining Stimulation Commission 1,000,000 hectares (2,250,000 acres) in the northern section of the Isthmus of Tehuantepec where large deposits of sulphur are supposed to exist. However, private interests will be permitted to work the tract under participation development concessions, which will be cancelled if the concessionaires violate Constitutional Article 27 which covers subsoil rights and uses.

BRAZIL—Discovery of a large and important deposit of pyrochlore is reported in Barreiro, Araxa, state of Minas Gerais. The deposit is said to contain about 80,000,000 metric tons of ore with the following mineralogical analysis: pyrochlore 6 to 14 percent, magnetite 32 to 35 percent, barite 8 to 12 percent, limonite 29 to 30 percent, quartz 2 to 3 percent, zirconium ore 5 to 7 percent, and apatite 6 to 10 percent. The average content of niobium oxide is about 3 percent, that is, about 6 percent of pyrochlore. This mineral reserve was estimated in 4,800,000 metric tons with a content of 45 to 60 percent of columbium oxide. The deposit belongs to FERTISA (Fertilizantes Minas Gerais S.A.). At surface the ore presents some sort of enrichment in columbium and rare-earth metals due to leaching of the more soluble elements, calcium, sodium, and uranium. At present the world consumption of pyrochlore concentrates reaches about 1,000 metric tons.

FEDERATION OF RHODESIA AND NYASALAND—The United Kingdom Atomic Energy Authority is sending a team of specialists to open an office in Salisbury. Members are: K. C. Branscombe, geologist-in-charge; A. T. C. Tidy, geologist; and W. C. D. Mullock, senior experimental officer. Object of the two-year assignment is to stimulate interest in the search for nuclear minerals throughout the country. Independent surveys, initially with British Landrovers, will be conducted. The office will also be empowered to buy small parcels of concentrates and thus encourage small-scale producers. New offices are being constructed, and interested parties may contact the staff by writing to Post Office Box 1482, Salisbury.

UNION OF SOUTH AFRICA—*Northern Investment Company Ltd.* has acquired outcropping copper deposits in the northeastern Transvaal from which ore and concentrates are expected to be produced this year. A chrome deposit has also been acquired and a plant will be erected to produce up to 1,000 tons of concentrates.

FEDERATION OF RHODESIA AND NYASALAND—Ore reserves at the *Dalny* mine in Southern Rhodesia owned by *Falcon Mines* have dropped to 457,000 tons at September 30, 1955, compared with 548,500 tons a year ago. However, the average gold content of the ore has gone up to 4.3 dwts. per ton over 103 inches. The stockpile of concentrates accumulated before the installation of the roasting plant has been completely retreated, and in an effort to increase ore reserves exploration is continuing by means of diamond drilling. Three holes have been drilled approximately 3¾ miles southwest of the Rix shaft on the Dalny property, one of which intersected ore bodies at vertical depths of 240 and 259 feet, assaying 4.2 dwts. over 56 inches and 3.8 dwts. over 50 inches, respectively. The other two holes intersected mineralized zones but assay results found them to be unpayable.

BELGIAN CONGO—GEOMINES is studying the possibility of erecting a plant to produce lithium carbonates on an industrial scale at Manono, Katanga. The plant would treat spodumene which is a byproduct (gangue) in its cassiterite-columbite-tantalite ore, and would use the process recently carried out successfully in a pilot plant in Belgium. The pilot plant is now producing on a continuous basis. For the 12-month period ended June 30, the company reports that it produced 3,804 metric tons of cassiterite concentrates (3,861 in the previous year) and 225 metric tons of tantalite-columbite (171 tons in previous year). The sale of tantalite-columbite concentrates is assured by contract to the end of 1956.

SOUTH WEST AFRICA—*Industrial Diamonds of S.A. (1945) Ltd.* is steadily increasing production at its new deposit at Saddle Hill North in the Luderitz district. In the third quarter, recovery improved to 4.713 carats from the previous figure of 3,829 carats.

TANGANYIKA — *Uruwira Minerals Ltd.* has its new mill running at its rated capacity. According to the agreement which Uruwira has with the United States government, repayment of its loan was to start on July 1, 1955 by setting aside a quantity of concentrate equivalent to the installment due; in keeping with these arrangements, 1,800 tons of concentrate valued at £125,000 were earmarked to meet first deliveries of lead and copper due on December 31, 1955.

ANGOLA—*Companhia de Diamantes de Angola* experienced some delay in the arrival of equipment for treatment of gravel by the "sink and float" methods, but it is expected that a substantial quantity of gravel will be treated by this method in 1956. Cost of the three units acquired, together with excavators, vehicles, etc. already exceeds £1,250,000. Prospecting during last year resulted in an addition of an estimated 1,084,000 cubic meters to the gravel reserve in the region of the Luachimo and Chicapa Rivers; prospecting by means of a Belgian drill put into operation in 1952 has revealed existence of an additional million cubic meters of gravel.

FRENCH WEST AFRICA—*Mines de Cuivre de Mauretanie*, which is develop-

ing the copper deposit at *Akjoujt*, has decided to increase its capital by an additional 100,000,000 francs, making the total capitalization 400,000,000 African francs.

NIGERIA—*Amalgamated Tin Mines of Nigeria* reports that it has completed all deliveries of columbite under its contract with the United States General Service Administration. *Keffi Tin Company*, a subsidiary, nearly doubled its output of columbite in 1954; it now plans to enlarge plant capacity and to build a new mill.

UNION OF SOUTH AFRICA—*Associated Ore and Metal Corporation Ltd.* has completed the dewatering of the old *Mutue Fides* tin mine and initiated underground exploration. It has been decided to install a pilot concentrating plant in the near future.

FEDERATION OF RHODESIA AND NYASALAND—Production of electrolytic copper by copper refineries in the Rhodesias reached an all-time high of 16,857 tons. The copper mines in the Northern Rhodesian copper belt have been assured of adequate timber supplies for smelter operations by the recent opening up of vast tracts of virgin forest about 50 miles west of the copper belt.

FRENCH EQUATORIAL AFRICA—*Cie. Miniere de l'Ogooue* has practically completed exploration of the manganese field in the Gabon area. Work on one of the tablelands has been finished, and other work is actively being carried out on the second plateau. Study of the ore confirms the previous favorable indications. It is now settled that the ore will be transported over a railroad to be built between the manganese country and the Congo-Ocean railroad which connects Pointe Noire, a port on the Atlantic Ocean, with Brazzaville on the Congo River. The survey of this projected railroad is not yet completed. Initially, 500,000 tons of manganese ore will be exported annually. *U. S. Steel Corporation* has a 49 percent interest in this project.

UNION OF SOUTH AFRICA—*South Geduld Gold Mines Ltd.* has acquired prospcting and mining leases for five years, with the option to purchase the mineral and surface rights of farms on the Orange Free State side of the border with Basutoland. Kimberlite deposits are presently being investigated, with reportedly encouraging results.

UNION OF SOUTH AFRICA—According to an official statement, uranium production in the Union which originally was estimated to increase in value to about £30,000,000 annually, is now likely to be expanded considerably above that figure—to about £53,000,000 annually.

UNION OF SOUTH AFRICA—*Barberton Chrysotile Asbestos Ltd.* has completed its new shaft in the central section of the mine and this is equipped for cage-hoisting. The shaft will also facilitate opening up of the Eastern Section below the mill adit level. Existing ore reserves are about eight years ahead of the mill at current treatment rates. The plant is to be modified to increase the percentage extraction. In the period of 1954-1955, the milling rate improved from 78,822 to 114,263 tons; fiber extraction from 2,155 to 3,103 tons, equivalent to 2.741 percent and 2.716 percent, respectively.

KOREA—The Reconstruction Board is studying a five-year plan to increase the iron ore mining and steel industries by the expenditure of about $4,000,000 and some 9,000,000,000 hwan. The program, proposed by the Ministry of Commerce and Industry, has as its goal the production of some 856,000 tons of ore and some 185,000 tons of pig iron during the five years. Part of the output would be exported. Steel production in Korea has been negligible since the war. Iron ore production in 1954 was 30,996 metric tons.

TURKEY—Representatives of the German firm of *Krupp* have signed an agreement with the newly formed *Turkish Iron and Steel Works* (see MINING WORLD, December 1955, page 83) and the Turkish government to form another new company called *Mines Exploration and Investigation Company*. Starting with western Turkey, iron ore deposits of the country will be investigated with a view toward establishing a second steel industry with Krupp's participation. Preliminary examination of the *Edremit* mines showed 6,000,000 tons of high-to-medium grade ore reserves, but containing traces of arsenic. The new company will expand previous investigations at the Edremit area, and will undertake exploration in the districts of Anamur, Silifke, and Iskenderun (Turkish Mediterranean coast). The sedimentary low-grade deposits of Adapazar area (northwest Turkey) with its larger known reserves may also be expected as a possibility if no satisfactory high-grade ore deposit should be found. A newly discovered iron ore deposit at Kiliclar near Ankara has also gained interest. It is expected that the exploration company will finish its investigation in three years.

MALAYA—More tin mines are opening up in the Jemuluang area of the Mersing district, Johore State. Fewer emergency restrictions and comparative quiet in that area are considered to be the reasons for the renewed activity. At several new mines, the palongs—long wooden troughs for holding tin ore worked by gravel pumps—have already been completed.

ISRAEL—Latest reports indicate that development of a copper industry in the Timna area is progressing with the start of construction of a water reservoir at Timna. This is the site of the King Solomon copper mines on the shore of the Red Sea. The building of the copper smelter itself is expected to take about two years. Capacity is reported to be planned for 1,500 tons of ore daily to produce about 7,000 tons of copper annually.

TURKEY—*Azot Sanayii T.A.S. (Turkish Nitrogen Industries Ltd.)* is building a 35,000-ton-per-year plant at Kutahya for the production of ammonia from gypsum. This, in turn, will permit the manufacture of 60,000 tons of ammonium sulphate annually. 100,000 tons of gypsum will be used in the operation, with extensive deposits at Bicer and Sazilar as the source. About 2,500 tons of sulphuric acid will be needed for the operation annually, and this will be obtained from the byproduct acid plant at the *Murgul* copper smelter.

Lithium

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various strikes and dips, some waste is included in the form of pockets. The dikes of this deposit are uniform in spodumene content throughout the entire deposit. However, care must be exercised to prevent contamination of the ore with the overburden and waste rock.

After clearing and stripping, an initial cut was taken across the highest section of the orebody preparatory to establishing benches. Currently benches are being cut around the perimeter of the deposit, and mining will advance toward the center.

Drilling equipment is identical with that used at the Murphy-Houser mine. A 1½-yard Bucyrus-Erie Diesel shovel loads the ore directly into the contractor's trucks, which haul to the plant 16 miles southwest of the mine where it is stockpiled. Waste is loaded by Cat D-6 front-end loaders and trammed in Koehring Dumpstors to the dump.

Lithium Corporation's North Carolina mining staff is headed by J. N. McClure, mine manager; Jim Sullins is mine foreman and D. D. Michalek is senior geologist.

INDIA—Latest country to offer to build a steel plant in India is Czechoslovakia. Richard Dvorak, Czech Minister for Foreign Trade, is reported to have made an offer, on behalf of his country, to build a 1,000,000-ton steel plant at an estimated cost of Rupees 100 crores. Money would be repaid by India in 25 annual installments at 2.5 percent interest. The Czechs would also train Indian technicians. Other plants already scheduled for construction are being financed by German, Russian, and British groups.

JAPAN—A pitchblende deposit containing uranium has been reported in an abandoned gold mine in the Tottori district.

MALAYA—*Kamunting Tin Dredging Ltd.* has concluded an agreement with a rubber company (name undisclosed) which will bring approximately 653 acres of tin-bearing area in the state of Perak into the company's mining sector. Ore reserves in this new acquisition are estimated at 11,000 tons of concentrate, with an approximate life of 16 years for the No. 6 dredge which is expected to work out its present reserves in 1958. The dredge will be transferred after that time and work in the new area will be on a tribute basis. Rate of payment will be 9.75 percent, in addition to a payment of Malayan $550 per acre as compensation for any rubber trees cut down.

BURMA—As of October 1, 1955, *Anglo-Burma Tin Company Ltd.* became a joint venture of the English concern and the Burmese government. The company has alluvial tin properties in the Tavoy and Mergui districts of Lower Burma, and has been inactive since 1951 because of unsettled conditions in Tavoy.

INDIA—The government has appointed a special committee to study the problems of the aluminum industry, and to draw up a plan which would aid in the development of this industry. The committee will examine a report on possible sites for additional units for aluminum production, considering the availability of power, bauxite ore, and other facilities, and costs.

KOREA—The *United Nations Korean Reconstruction Agency* (UNKRA) has allocated $110,000 to continue operation of the mineral assay laboratory at Taejon through June 1957 and to complete the training of a Korean staff to take charge of its work. The laboratory was set up and equipped by UNKRA to provide modern facilities for evaluating Korea's mineral wealth. Since its opening in March 1954, the laboratory has tested more than 5,000 samples of mineral-bearing ores and sands from all parts of the Republic. Its work has ranged from analyzing sacks of ore carried in by part-time prospectors to aiding in exploration of major deposits of gold, graphite, limestone, and other resources.

MALAYA—Tin prospectors are now at work on the Temerloh Rubber Estates following an agreement that they may drill without injuring the trees. Prospecting operations are taking place 17 miles from Taiping and the whole project is carried out on behalf of the *Temerloh Rubber Estates Company* who has 1,092 acres of rubber trees.

INDIA—Deposits of lead ore have been found near Dewal Dhar in Almora district. The deposits reportedly have been traced for about a mile and a half, between the villages of Chhannapani and Shiskhani.

ISRAEL—A four-year mineral development plan submitted by the Minister of Development proposes completion of the copper plant at Timna near Elat and the development of Dead Sea bromide and magnesium deposits. Also in the plan are suggestions for a railroad from Sodom to Elat, a port at Elat, and additions to the electric power system.

JAPAN—The Ministry of International Trade and Industry has announced an estimated production plan for all materials, extending from 1956 to 1960. The non-ferrous metal goals are as follows: electrolytic copper—1956—96,000 metric tons, 1960—114,000 metric tons; aluminum—1956—64,000 metric tons, 1960—79,000 metric tons; zinc metal—1956—115,000 metric tons, 1960—130,000 metric tons; lead metal—1956—148,000 metric tons, 1960—155,000 metric tons.

AFGHANISTAN — Negotiations reportedly are underway between Afghan officials and the U.S.S.R. regarding the export of sulphur ore from the recently located Dar-i-Suf deposit to the U.S.S.R. The Dar-i-Suf deposit is located in the Alburz Mountains 20 miles southwest of Mazar-e-shareef, and is estimated to contain about 1,000,000 tons of sulphur ore with a sulphur content of 60 to 70 percent. Another deposit on the northeastern border near Chetraal has not yet been surveyed in detail but its extent is estimated at about 300,000 tons of ore containing 60 percent sulphur.

BURMA—Indian geologists, prospecting for iron ore, have found an iron ore deposit at Wegyi village on the opposite river bank from Sinbo village. Results of diamond drilling for iron ore in the Tavoy district have been disappointing.

PAKISTAN—Rich deposits of chrome and manganese have been reported in West Pakistan's Kalat division. The manganese is located about 18 miles east of Lasbela, while the chrome exists at various places in the Rasko range in Kharan district. Plans for development of the deposits have been approved and work will start shortly. The manganese deposits will be worked by the Mining Department of the Baluchistan States Union, while the chrome deposits may be leased to private industrial firms.

Review
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Consolidated Mining and Development Corporation into such successful operation. Don't overlook Gordon de Villiers, manager of Hartebeestfontein, for his hard work and efficient management for the company to accomplish so much (see above under foreign company). The greatest tribute to his management is the fact that for two straight years the company won first place in the Prevention Of Accidents contest for developing mines.

No mention can be made of important men in mining without paying tribute to three great figures in the industry, each of whom has contributed so much during his more than 50 years in mining. They are: Stanley Easton, who you might say made the Bunker Hill and Sullivan Mining and Concentrating Company in the Coeur de A'lenes; Cornelius Kelly, who has been "Mr. Anaconda" in more ways than one for many years; also the indominatable Judge J. W. Hausserman, president of Benguet Consolidated Mining Company, who has fought ahead during wars and peace in the Baguio gold district in the Philippines.

The Rare Metals Corporation of America was the nation's *Fastest Growing Mining Company* in 1955. Starting the year with only a few employees, by year's end it was operating the 175-ton-per-day Idaho-Almaden mercury mine and furnace near Weiser, Idaho, and rushing completion of a uranium mill at Tuba City, Arizona.

U_3O_8 Mill Plans Highlight 1955—and Beyond

Passing of the peak of uranium frenzy in 1955 brought disappointment and surprises to many. However, there will be plenty of activity on all uranium fronts in 1956—and beyond, for that matter.

Most Important Uranium Happening was the sale in late November of the famous Happy Jack mine at White Canyon, San Juan County, Utah for a sum which may reach $30,000,000.

The uranium milling picture changed almost daily in the last quarter of 1955, so what you read here can very well have been supplemented by new plans or change. However, in September 1955 the AEC was known to have sound proposals for at least six additional uranium mills. As of December 13th one of these had been publicly announced.

Within the uranium milling industry there appear to be at least two schools of thought. The first is that many new mills are needed and that it is better, faster, cheaper, and perhaps more profitable for the mining companies to have relatively small mills erected near developed ore reserves. The second group thinks that more small mills are not needed and are not economical. They believe it better to centralize milling in big plants which can readily be expended at lower per ton cost than to build smaller new mills. Further, the second group believes that the added cost of trucking ore to big mills is more than offset by lower milling costs, lower capital-return costs, and higher uranium recovery.

Actually, there must be a need for both proposed types. However, the late 1955 trend definitely was to mill additions: those of Union Carbide Nuclear Company (Uravan, Colorado), Kerr McGee Oil Industries, Ltd. (Shiprock, New Mexico); AEC (Monticello, Utah); and Vitro Uranium Company (Salt Lake City, Utah).

Most recently announced new uranium mill is the 200-ton-per-day mill of Continental Uranium, Inc. at La Sal Utah.

Central Wyoming should be the locale of the second new mill. However, there is conflict of interest as to where it should be built. Some favor Riverton because the AEC stockpile and ore buying station are already there. Others feel that the Gas Hills district is the most logical site because of the large tonnages of very low grade material, adequate water, etc.

The third mill site area to watch is Spokane, Washington. Already, the Newmont Mining Corporation subsidiary (Dawn Mining Company) has blocked out many tens of thousands of tons of ore-grade uranium at the Midnite mine on the Spokane Indian Reservation and has conducted extensive metallurgical testing. Other important ore reserves for such a mill are in the Mount Spokane district.

Good grade uranium ore should be shipped from Alaska during 1956; in fact, it will be the first uranium ore ever shipped from Alaska. Spokane is the most logical recipient for the ore, because it is the closest uranium district, and freight costs would be nominal. This Alaskan ore gives an added impetus to the need for a mill near Spokane.

Another mill in the Grants-Laguna district of New Mexico definitely seems needed. Sabre Uranium Company has announced very extensive ore reserves in the area; the Climax-St. Anthony ore body, delimited by drilling, also an important one. As is that of Kerr McGee. There are others, too. While Kerr-McGee's expanded Shiprock mill will use all the ore the company can mine in the area, there is a mining potential ahead of milling.

A very interesting race is on between the Grants-Laguna district and the Big Indian district as to which will be the largest producer of uranium. Here's the way it looks now. Total pounds of known uranium in each district are about the same. Grants leads in tonnage and Big Indian in grade. This is as it should be for complete recovery, because Grants' ore can largely be recovered by low-cost open pitting, while Big Indian production must come from deep underground mines. When and if the very low-grade Jackpile mineralization is converted to ore, Grants will win.

A mill in the White Canyon, Utah district is indicated; in fact the National Mining and Milling Corporation has announced plans for an ore-to-metal mill to treat its Happy Jack mine ore. Nuclear Metals Corporation and others are reported interested in a mill, also.

There has been much speculation about a mill in the North Big Indian district, Utah. Homestake Mining Company has large reserves in the north end. E. L. Cord and Associates are completing a deep shaft to get into production, Cal Uranium Company has very large reserves, Almar Minerals, Inc. is mining at its Far West shaft, and Hecla Mining Company (operating contract at the Radon shaft of Federal Uranium Company) is developing for large-scale production.

So don't be surprised if a new mill is built south of La Sal to treat this north end high lime ore. Also don't forget that an enlarged Uranium Reduction Company mill at Moab could easily treat this ore, too.

Don't count out Karnes, Duval, and Gonzales counties Texas for possible mill site. However, there is a question about enough tonnage to justify a mill. One good deposit, which would make a very nice ore body on the Plateau where milling facilities exist, has already been drilled out. However, the deposit is not high grade enough to stand railroad shipping charges to Colorado, nor is it big enough to justify a mine-site mill. Only one more deposit of the same size and grade is needed to justify a mill. Several companies have drilled to find that second deposit; others are still seeking. Good luck!

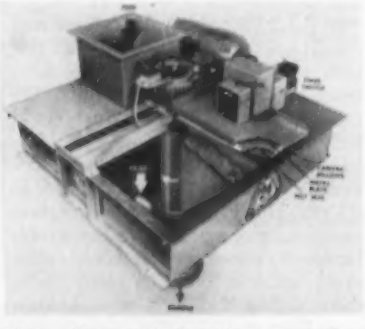
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

Voltage Regulated Circuit Now in Low Priced Counters

The Atomic Research Corporation announces a newly designed voltage regulated circuit in their lowest priced Raytomic counters.

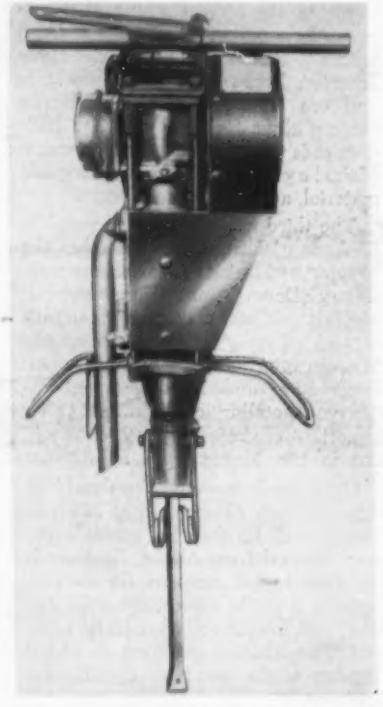
The manufacturer states that the new circuit incorporates a voltage regulator tube which offers these specific advantages to the user: continuous and constant high voltage fed to the Geiger tube despite normal battery weakening; stable, accurate, easy-to-interpret meter readings as the erratic meter needle action due to voltage spurts and gushes is now eliminated; and finally, battery life and economy is increased by some ten percent. Send for more information. Circle No. 22.



New Dust Tight Automatic Sampler by Deco

A new Denver Automatic (Vezin Type) Dry Sampler has just been completed which promises to answer the dust problem in many dry sampling operations. The unit pictured resulted from a cement manufacturer's need for a dust-tight sampler to handle his extremely fine product. All material in the system passes through enclosed ducts.

A unique feature of this sampler is the solenoid-controlled cover over the cutter opening which prevents continuous sampling. As shown in the cutaway section of the photo, a felt pad rests firmly on the cutter blades, effectively sealing them against the entrance of dust. This felt pad is attached to a metal plate which, in turn, is attached to a canvas bellows. The canvas bellows is secured to the bottom surface of the sampler cover plate. For further information circle No. 13.



Improved Syntron Gasoline Hammer Rock Drill

The Syntron Co. of Homer City, Pa., has added an improved self-contained gasoline hammer rock drill to their line of power tool equipment.

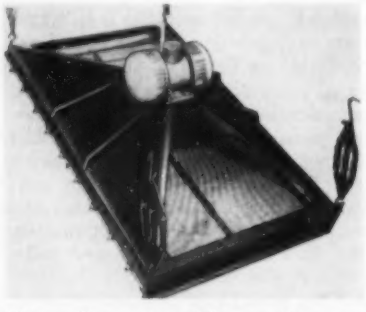
According to the manufacturer, this improved model rock drill, the Model RD-55, can drill to the depth of thirteen feet at a rate of approximately two feet per minute when using Syntron hollow drill steel with carbide tips. In addition to providing automatic rotation of the drill steels, air compressed by the reciprocating hammer or striking piston will blow the dust and cuttings out of the hole. This prevents jamming or sticking of the drill steel in the hole.

Three sets of drill steels are available for use with the drill. They range in length from 2 to 13 feet. Circle No. 14 for complete information.

Kenworth 802-B Tractor Dump Trailer Announced

Kenworth Motor Truck Corporation of Seattle, Washington announces the design and manufacture of a new earth-mover truck-tractor with dump semi-trailer, called the 802-B.

With a capacity of 32 cubic yards (struck), the vehicle's gross combined weight is 165,000 pounds. The 802-B is powered by a 300 hp turbocharged Cummins NRT-600 diesel engine. In dumping, the entire trailer raises, and the rear trailer wheels move forward to a position directly behind the tractor tires. The fifth wheel is equipped with a ball and socket which provides complete flexibility in the dumping operation. A special guide and equalizer stabilizes the body when dumping, so that there is no strain or twist of the twin, three-stage Kenworth telescopic hoist. Circle No. 11 for further information.



New Syntron-Sinex Screen Now in Production

The Syntron Company has announced the addition of a new vibrating screen to their line. The new Syntron-Sinex Screen provides fast uniform sizing of materials and is available in single or double deck models, either open (as illustrated), or totally enclosed. It is designed for suspension mounting.

The vibrating unit is a sealed, permanently lubricated electric motor with unbalanced weights on the shaft. The screen area is vibrated 3600 vibrations per minute with an amplitude of 3/16-inches. Further information may be obtained by circling No. 78.

ROOF BOLT INSTALLATION: The Consolidated Tool Co., of London, England have recently made available a comprehensive brochure describing CP tools for all types of roof bolt installation. Circle No. 1 for your copy.

INDUSTRIAL SCREENS: Cal-Wic industrial screens by CF&I are woven to the most exacting tolerances. According to the manufacturer, Cal-Wic screens give unusually long life because they are tightly crimped to prevent hidden wear at the wire intersections. Wires can't work loose under even the most severe vibrations. Circle No. 2 and learn more of the wide range of screen types and alloys available.

TRUCK BODIES: Publication of a new 4-page catalog describing the company's complete line of dump bodies, hydraulic hoists, trailer dumps, hydraulic Load-N-Gates, and special truck equipment, is announced by Hercules Steel Products Company, Galion, Ohio. For your copy circle No. 4.

SERVICE MANUAL: A new 48-page maintenance and service manual on lead acid batteries for all types of motive power application has just been issued by C & D Batteries, Inc. The book includes photographs, charts, tables, methods of repairs, maintenance and salient points on theory of operation. Circle No. 5 for your copy.

TRACTOR SHOVEL catalog is now available from the Construction Machinery Division, Tractor Group, Allis Chalmers Manufacturing Company. This 8-page catalog features the new 2¼-yard Allis Chalmers HD-11G Tractor Shovel. Send for your copy by Circling No. 6.

POWERFUL TRACTOR SHOVEL: The Clark Equipment Company states that the introduction of a turbocharged Diesel engine rated at 165 hp for the Michigan Model 175A makes it the world's most powerful rubber-tired tractor shovel. The 175A with a 2¼-cubic yard bucket capacity and weighing 24,100 pounds, has four-wheel drive, and rear-wheel steering. Find out more about this powerful tractor shovel by circling No. 7.

LUG-ALL WINCH-HOIST: The Lug-All Company, Haverford, Pa. now offers an all new lightweight 2-ton winch-hoist with 20 feet of cable. It lifts, lowers or pulls up to 2 tons a distance of 10 feet when used with double cable or handles 1 ton a distance of 20 feet when used with single cable. Price for the new Model 4000 is $49.50, f.o.b. factory. Circle No. 44 for further information.

CF&I ROCK BOLTS enable progressive mine operators to economize and, at the same time, provide greater safety and better housekeeping in their mines. CF&I Rock Bolts are available in either slot and wedge or expansion shell with Pattin shell types. Circle No. 9 for further information.

PNEUMATIC CYLINDERS: The Ledeen Mfg. Co. of Los Angeles, producers of valves, cylinders, valve actuators, and air-hydraulic pumps and boosters, have now available a catalog describing their latest type pneumatic cylinders. Circle No. 54 for your copy.

AERIAL SURVEY CATALOG: Hycon Aerial Surveys, Inc., has now available a brochure giving complete examples of their work, which includes magnetic, photogrammetric, radiation, electromagnetic, mapping and exploration services. Circle No. 32 for yor copy.

BITE DIRT with the new special analysis steel cutting edges manufactured by the Hensley Equipment Co., San Leandro, California. These cutting edges are precision punched to fit all kinds of earth-moving equipment. All cutting and ripping edges are available either plain or hard-faced. Circle No. 64 for further information.

HIGHER TORQUE BRAKE: Stearns Magnetic Inc. announces the availability of the new Stearns H-1200 Magnetic Disc Brake. This brake is for use in the 50 to 100 hp range, and its improved design permits the brake to develop higher torque, yet take up less space. Circle No. 15 for information.

CHAIN COUPLINGS: Dodge Manufacturing Company have recently added Dodge Taper-Lock Chain Couplings to their line of Taper-Lock Sprockets and Roller Chain. The new Couplings are of a flexible type and permit sufficient relative movement between the hubs to accommodate slight shaft misalignment. Circle No. 16 for further information.

MAGNETIC CHUTE: The Prater Pulverizer Company have announced the availability of their zig-zag magnetic chute. This chute built in the shape of a flat horizontal V, contains two permanent magnets which enables the chute to trap iron in the muck passing through it. Circle No. 17.

"GUNITE" APPLICATIONS FOR MINES: Bulletin 3000, available from the Cement Gun Company, describes and illustrates how "Gunite" can be used for both surface and underground mining installations. Whether you want to repair concrete bulkheads, portal entrances, water reservoir dams, "gunite" drifts or addits, shafts, stations, etc. to prevent sluffing, stop water leaks by pressure grouting, or re-line open hearths or boiler furnaces, you will find money-saving ideas described. Circle No. 50 for yor copy.

OFF-HIGHWAY TRAILER BROCHURE: Easton Car & Construction Company has a new brochure illustrating its complete line of off-highway trailers and truck bodies. These range in size from the 48-ton type TP Low Frame trailer to the 15-ton type BP truck body with a side-dump doorless pan. If you are interested in haulage equipment for a new mine or interested in replacing older equipment, you will want a copy of Easton's Catalog 2. Circle No. 23.

LUBRICATION DATA BOOK: Fiske Brothers Refining Co. has a 16-page Lubriplate Data Book (55-1) available to interested readers. It is full of lubrication ideas, recommendations, and informative data. Proper Lubriplate products are listed for various temperatures, moisture conditions, operating speeds, and variable load factors. There are also lubrication tables for trucks and tractors, mining equipment, electrical equipment, and many others. Circle No. 24.

DETECTS ALL METALS: The R. C. A. metal detector uses a high-frequency electro-magnetic field to probe out all types of metals — magnetic and non-magnetic. Made by Radio Corporation of America, the detector is quickly and easily installed and can be adjusted to fit all mill conditions. An interesting 4-page brochure is available which fully describes and illustrates the metal detector operation. For your copy, Circle No. 25.

THE MORAN GAMMA LOGGER is a complete motor driven scintillation counter logging unit designed for the professional prospector and mining en-

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to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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ginner. The unit can be mounted rigidly on a drill rig or supplied with a portable mounting base for installation on the bed of a pickup truck, jeep, or station wagon. The probe is easily centered over the drill hole by means of an extending arm which swings on a horizontal axis. Circle No. 26 for further information.

LIGHT-WEIGHT CHURN DRILL: The Hossfield Mfg. Company has available a light weight drill for prospecting and exploration. The drill weighs 1300 lbs. with counterweights, and can be towed on its own chassis behind a vehicle or be quickly broken up into 100-lb. packages. Using the "churn" principle of operation, the high speed reciprocating drill, powered by a 5 hp motor, feeds itself. For more information on this practical drill, circle No. 27.

PACKAGED WARNING: A stench warning system for mines has been developed in packaged form by Reed Engineering, Los Angeles. Designed to be self-injecting into 100 psi air lines, the system utilizes a steel pressure cylinder containing Ethyl Mercaptan plus a surplus of an inert gas propellent and flame quencher. Circle No. 28 for further information.

TWO NEW DIESELS: Production of two new turbocharged Diesel engines, the Cummins NTO-6 and NT-6 Turbodiesels, is announced by Cummins Engine Company, Inc. Now available for automotive, off-highway, and industrial applications, the NTO-6 Cummins Turbodiesel develops 262 horsepower, while the NT-6 is rated at 250 horsepower. Maximum speed of both is 2100 rpm. Circle No. 29 for further information.

INTERNATIONAL CRAWLER: New power, durability, and operator comfort are featured in the increased horsepower International TD-14A Diesel crawler tractor, now available from the International Harvester Export Company. The TD-14A has 72 drawbar horsepower and drawbar pull of 17,100 pounds at rated governed speed. The TD-14A is equipped with box-section track frames that are now 300 per cent stronger. Push button, all weather starting is also featured. Circle No. 30 for further information.

LIGHTWEIGHT SHEAVES: A new line of lightweight "Texlite" sheaves for fractional horsepower and light duty industrial drives has been announced by the Allis Chalmers Manufacturing Company. The line includes single-groove sheaves in both bushed and bored-to-size construction with "A" section, or combination "A-B" grooving. Circle No. 31 for more information.

LOW BOWL DESIGN: A pamphlet entitled "A New Caterpillar Scraper, the No. 463" has just been released in conjunction with the announcement of the new low bowl design Caterpillar scrapers. The No. 463 is a four-wheel crawler drawn scraper with the new low bowl design, giving bigger loads, faster loads, and lower cost per yard of material moved. Circle No. 39 for your pamphlet.

WATER HOSE DATA SHEET: A new illustrated data sheet on its line of water hose has been issued by the B. F. Goodrich Company Industrial Products Division, Akron, Ohio. The data sheet describes special hose constructions available for uses ranging from wetting dust in mines, to stripping and sluicing. Circle No. 40 for your copy.

PORTABLE SKYHOOK: The B. E. Wallace Products Co. state that the Magic-Pole A-Frame is a practical, portable "skyhook" for supporting hoists at many places, where adequate means for bolstering the load are unavailable. The standard model handles 4000 lbs., has a working height of 10 feet, yet weighs only 45 lbs., complete with guy line. Circle No. 48 for further information.

SCREEN IMPROVEMENT: An optional secondary spring suspension designed to eliminate transfer of vibration, increase freedom of screen motion, and to reduce strain on moving and structural parts, has been developed for its larger screens by Pioneer Engineering Works, Inc. Circle No. 41 for additional details on this vibrating screen improvement.

NEW MANCHA: The Mancha Storage Battery Locomotive Division, Goodman Manufacturing Company, has added a 2-ton Diesel powered unit to its line of locomotives. Suitable for either 18-inch or 24-inch gauge track, this new unit features torque conversion, and an effective exhaust scrubber. Circle No. 45 for further information.

WIRE ROPE BLOCKS and fittings are described by Sauerman Bros. in two recently released bulletins. They contain information regarding their Durolite blocks, and also tables, drawings and ordering information for open and double wedge sockets in rope sizes from ⅜-inch to 2-inch. Circle No. 46 for your copy.

SPECTROGRAPHIC WORK: A new Norelco Geiger-counter tube, designed for X-ray spectrographic work involving elements such as phosphorus, silicon, and aluminum, has been announced by the North American Philips Co. Inc. Operating potential of the Norelco tube is 900 volts. The background count with 2 inches of lead shielding is 75 counts per minute, maximum. For further information circle No. 51.

DETECTS MECHANICAL FLAWS: Auditec, a new portable electronic instrument for detecting faults and bearing failures in motors, machinery leaks in pipe-lines, and surface flaws in many materials, has been introduced by John Ould, (U.S.A.) Ltd., Mount Vernon, New York. Circle No. 53 for further information.

TRANSISTORIZED instruments are featured in new Universal Atomics Corp. catalogs. UAC's latest line of Geiger Counters and Scintillation Counters are described in these folders. Available also is a description of gamma ray surveying for the location of oil. Circle No. 60 for your copies.

LONGER LASTING BATTERIES: C & D Slyver-Clad Extra Capacity Batteries offer 20 per cent more capacity and a 35 per cent longer work-life for electrically driven mining equipment according to the manufacturer, C & D Batteries, Inc. If you want more power from your battery operated locomotives to reduce haulage costs, you will want further information about these batteries. A new catalog, "Batteries for the Mining Industry," is available. Circle No. 75.

TRANSIT READS DIRECT TO 20 SECONDS: The new Wild Model T-1 optical repeating transit reads direct to 20 seconds, with interpolation to 10 seconds. The instrument is designed for fast set-ups, error-free readings, and maximum versatility. Wild instruments offer many other advantages which are fully described in available literature. Circle No. 77.

STOODY AUTOMATIC WIRES: The Stoody Company has available catalogs describing automatic and semi-automatic welding with Stoody Alloy Tubular Wires. These alloy wires replace welding rods for hardfacing. The alloy material is contained in the wire which is fed continuously to the point of application. Circle No. 79 for your copies.

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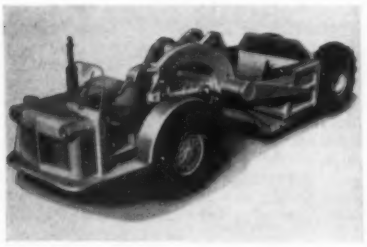


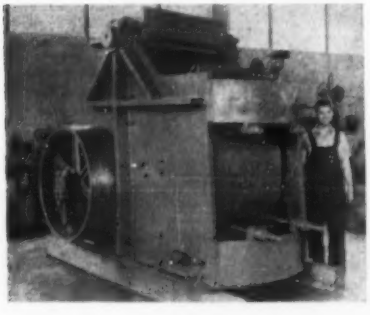
New 7-yard Scraper Announced by Euclid

The latest addition to Euclid's line of motor scrapers, the Model S-7, is now in production. The S-7 gives Euclid a scraper line with 7, 12, 15.5, and 18 cubic yards struck capacity.

The S-7 is Euclid's first overhung engine scraper to go into production. It is powered by a 143 H.P. Diesel with a 5 speed transmission. Tires are 18.00 by 24, 16 ply. All of the scraper operations, bowl, apron, and ejector, are controlled by hydraulic lever action. This feature provides independent control and eliminates the down time and expense resulting from cable breakage. Circle No. 74 for further information.

Vulcan-Denver Features Hydraulic Coupled Hoist

The Vulcan Iron Works of Denver, Colorado announced recently the completion of design and construction of a new single and double drum, gasoline or Diesel powered hoist. The hoist features a hydraulic coupling between the power unit and the machine. This fluid coupling provides much smoother operation, facilitates control, and eliminates stalling under load conditions. According to the manufacturer, a more economical hoisting operation may be realized with this coupling. The new Vulcan Denver hoist unit will provide rope pulls from 2,000 to 7,500 pounds. For further information circle No. 3.



New Low HP Jaw Crusher Crushes Without Rubbing

The Straub Mfg. Co., of Oakland, California state their new Kue-Ken Simplex crusher operates with less horsepower and crushes without any rubbing action.

The Kue-Ken crushes by pressure only, with no rubbing and minimum abrasion. The path of travel of the jaw plates is squarely against the rock, instantly gripping and crushing without rubbing. This is because the hinge pin, holding the movable jaw, is well above and on the centerline of the crushing zone formed by the two jaw plates. As the large movable jaw swings on the hinge pin, less power is needed to operate the crusher. Other features incorporated in the crusher are higher operating speeds, ability to be choke fed, positive crankcase type oiling system, machined and polished working faces of toggle plates and seats, strong, lightweight pitman (always in compression), and overload protection. For further information regarding this different type of crusher circle No. 20.

New Self-Propelled Power Crane Has Been Announced

The Schield Bantam Co. of Waverly, Iowa, has announced the introduction of a new self-propelled ¾-cubic yard, 6-ton shovel-crane for materials handling and industrial applications.

The new self-propelled Bantam features 12,000 pounds lifting capacity, and an outside turning radius of only 19½ feet, which gives it extreme maneuverability for getting into tight working quarters to handle heavy loads. Another important feature of the Bantam is two-speed independent travel which allows the operator to work the upper deck machinery and travel at the same time. The steering mechanism and brakes are controlled hydraulically, while the travel mechanism and upper machinery operate on a mechanical control principle. Circle No. 71.

Lightweight Recorder for Geophysical Applications

A new compact, and rugged recorder is now on the market for prospectors and geologists. This recorder, manufactured by Douglas & Geirens, Inc., North Hollywood, California, is to be used in conjunction with Geiger or Scintillation counters.

Called the Record-A-Meter, this instrument is ideal for mobile and airborne prospecting. The instrument will also record radioactivity vs. depth of a probe lowered into a drill-hole. Weighing only 12 pounds, and measuring 10 by 7⅝ by 5⅜ inches, the instrument can easily be packed or transported. The Record-A-Meter contains its own power supply which permits it to operate on either a AC or DC power. Circle No. 19 for more information on this versatile recorder.

New Wild Transit Readings Direct to 20 Seconds

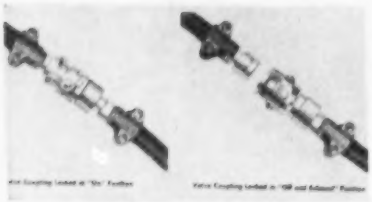
A recent addition to the Wild Heerbrugg line is the new model Wild T-1 Optical Repeating Transit with direct readings to 20" and easy interpolation to 10", on both horizontal and vertical circles.

Compared to the standard Wild instrument, which reads directly to 1 minute with estimations to 6 seconds, the new model's minute graduations on the micrometer scale are subdivided into three units.

Concurrent with the availability of this latest Wild Heerbrugg instrument, prices on both the standard and new models have been reduced. The Wild Standard Model is $700, and the new model is $718, f.o.b. Port Washington, N.Y. Price includes metal carrying case and wooden shipping case, with tripods extra. Circle No. 12.

Wear Take-Up Adjustment Featured By Krogh Pumps

The Krogh Pump and Equipment Co. now have on the market their Model 600 full lined sand and tailings pumps. These pumps, designed for a rough class of heavy duty pumping, feature a wear take-up adjustment device at the end of the pump shaft. This feature insures the proper clearance between rotating impeller and stationary nozzle. The impeller and all liners can be readily removed from the shell, or casing, and reinstalled without dismantling the drive end of the pump and without disconnecting the discharge pipe. Pumps range in size from 1¼ to 8 inches and can pump against heads up to 80 feet. According to the manufacturer, these tailings pumps have passed through gravel ranging in size from 6 to 8 inches. For further information circle No. 18.



New Valve Coupling Gives Complete Air-Line Control

Newly introduced by C. B. Hunt & Son, Inc., Salem, Ohio, these new Quick-As-Wink Valve Couplings give the operator complete control of the air line. They are designed to permit line air to be shut off and tools changed easily, quickly and safely at any point. The valve couplings may be locked in the "On," "Off," or "Exhaust" position. A novel feature of the valve coupling is the exhaust position. When the valve is in the "Exhaust" position, line air is stopped and the air tool and trapped air in the line are allowed to escape, thus facilitating the removal of the tool. For further information and a bulletin on these valve couplings circle No. 21.

Deep Hole Probe Unit Highly Portable

The Bogue Electric Manufacturing Company has developed a completely mobile deep hole probe unit. Prospecting for uranium at depth is greatly simplified by using this unit. Originally developed for the Atomic Energy Commission, the unit is now available for civilian use. Mounted in a jeep the equipment operates from its own power supply thus insuring its mobility.

An electronic probe, about 3 feet long and 3 inches in diameter, is lowered into a test hole by a cable boom which projects over the side of the Jeep. The effects of radio-activity on the probe are relayed through the cable to the scintillation counter in the Jeep. Obtain further data by circling No. 69.

AC Announces New 280 HP Bottom Dump Motor Wagon

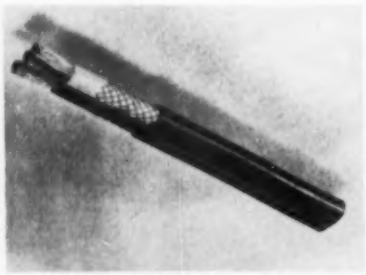
A new hydraulically operated bottom dump motor wagon, the TW-360, has been added to the Allis-Chalmers Manufacturing Company's line of earthmoving and construction machinery. This new 47,000 pound unit is powered by the Allis-Chalmers 280 HP Diesel engine providing, at 2100 rpm, forward speeds ranging from 3 mph in first, to 20 mph in fourth gear. Reverse speed of the TW-360 is 3.1 mph.

The motor wagon, with a 22 ft. wheel base, has a 22 cubic yard heaped and a 17 cubic yard struck capacity, or 26 tons. Operating efficiency and operator comfort is provided by such features as two-speed hydraulic steering, 24-volt electric system, and 4-wheel air brakes. Simple one-lever control operates doors which retract along the sides of the body for greater ground clearance and wider door openings. For further information circle No. 10.

Rubber-Tired Diesel, 165 H.P. Dozer Announced

The first rubber-tired dozer powered by a turbocharged Diesel engine has been introduced by the Construction Machinery Division of Clark Equipment Co.

Named the Michigan Model 180 Turbo-Dozer, the machine has a 165 horsepower rating and a capacity of 2-¾ yards. It has a road speed of 27 miles per hour, the fastest in its field, and has four-wheel drive and rear wheel steering which permits full power on wheels even while turning. The machine features hydraulic controls which facilitate easier maintenance, a bowl which can be tilted by the operator while the machine is in motion, the ability to move under its own power over the highways, a power-shift transmission, and a heavy duty torque converter which automatically provides up to 3 to 1 torque multiplication. For further information circle No. 76.

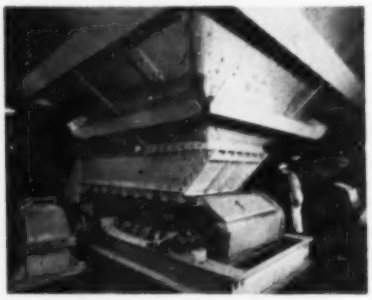


Anaconda Produces Tough Shuttle-car Cable

A new shuttle-car cable with greatly increased life has been announced by the Anaconda Wire and Cable Co.

Answering problems that have often plagued miners, the Security-flex cable embodies several major improvements which reduce the chances of failure.

Shuttle-car cables are ordinarily subject to severe mechanical damage, excessive tension and overload current. Failures in the past have resulted more from the breakdown of the insulators or conductors than from failure of the jacket. This new cable made with a rugged, high-grade, heat resistant neoprene insulating compound, gives physical toughness on the inside as well as on the outside. For more information circle No. 56.

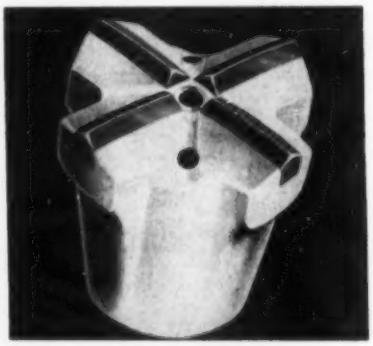


AMSCO Pan Feeder Now Moves Over 3,000 T.P.H.

Investigate the possibility of a Stephens-Adamson "AMSCO" manganese steel pan feeder for your operation. These pan feeders are available in widths from 22" to 126", with capacities ranging from 100 T.P.H. to 3,000 or even more T.P.H.

The wearing parts of the feeder are of tough manganese steel which work hardens under impact and has the property of self-lubrication on surfaces working on each other. As a result of this it is unnecessary to lubricate chain joints.

The company has recently published a bulletin complete with photographs, tables, and other data regarding the manganese steel pan feeders. Circle No. 8 for your copy.



Five Hole Rok-Bit Offers Better Chip Removal

The Brunner & Lay, 4 by 7.50 Rok-Bit, has the regular center hole plus two additional holes on the face and two more on the sides—five air holes in all. The additional holes give better chip removal, so the bit is not working in its own cuttings. It is available in 4- and 4⅝-inch gauge sizes and is made to fit directly on the steel without the need for an adapter. According to the manufacturer, the bit will stay sharp longer, drill faster, and will require less reconditioning. For further information on the Rok-Bit, Circle No. 2.

U.S.A. Metal & Mineral Prices

METALS

		December 23, 1955
COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	43.00¢
	Lake. Delivered, destinations, U.S.A.	43.00¢
	Foreign Copper. Valley basis	43.00¢
LEAD:	**Common Grade.** New York	15.50¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$195.05
	Prime Western; F.o.b. E. St. Louis	13.00¢
	Prime Western; Delivered, New York	13.50¢
	Tri-State Concentrate, 60% zinc, per ton	$84.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	24.40¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98% (per pound)	$10.00-$13.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Velasco, Texas, per pound	32.50¢
MERCURY:	**Flasks.** Small lots, New York	$280.00-$284.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery, Port Colbourne, Ontario	64.50¢
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	$1.09¾
TITANIUM:	99.3% + Grade "A" (Price per pound)	$3.15-$3.45
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.50¢ per ounce
	Foreign Handy Harmon	90.50¢
PLATINUM:	**Per Ounce**	$97.00-$99.00
ZIRCONIUM:	**Sponge, Per Pound**	$10.00

ORES AND CONCENTRATES

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CHROME ORE: F.o.b. railroad cars eastern seaports. Long tons dry weight.
African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio — $44.00-$45.00
African (Transvaal). 48% Cr_2O_3. No Ratio — $31.00-$32.00
Turkish, 48% Cr_2O_3. 3 to 1 chrome-iron ratio — $52.00
U. S. Government ore purchase depot Grants Pass, Oregon. Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.

COLUMBIUM-TANTALUM ORE: At United States small lot beryl purchase depots, $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)

IRON ORE: Lake Superior. Per gross ton Lower Lake Ports
Mesabi, Non Bessemer, 51.5% Fe. Second quarter — $10.10
Mesabi, Bessemer, 51.5% Fe. Second quarter — $10.25
Old Range Non Bessemer. Second quarter — $10.25
Old Range Bessemer. Second quarter — $10.40
Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit — 22.00¢

MANGANESE ORE:
Metallurgical grade. 48 to 50% Mn. Long ton unit — $0.96
Metallurgical grade. 46 to 48% Mn. Long ton unit — $0.94
Metallurgical grade. 45 to 46% Mn. Long ton unit — $0.87
Chemical grade. 80% MnO_2. Per Ton — $70.00
Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore, Phillipsburg, Montana; base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

MOLYBDENUM CONCENTRATE: **90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained** molybdenum, plus cost of containers — $1.10

TUNGSTEN CONCENTRATE:
Domestic. 60% WO_3 Per short ton unit — $63.00
Foreign. 65% WO_3 Per short ton unit (Scheelite) — $35.00
Foreign. South American, Spanish, Portuguese — $34.00

URANIUM ORE: **Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. At Monticello ores will be paid for in accordance with metallurgical characteristics.

VANADIUM ORE: **Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello Shiprock, and Bluewater ..... Per Pound V_2O_5 $0.31

NON-METALLIC MINERALS

BENTONITE: **Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots — $12.50
Oil Well grade. Packed in 100 pound paper bags — $14.00

FLUORSPAR: **Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines — $30.00
Mexican. 70% f.o.b. border — $22.00
European, Atlantic Ports, 70% — $30.00
Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado — $49.00

PERLITE: **Crude:** F.o.b. mine per short ton — $3.00 to $5.00
Plaster grades. Crushed and sized. F.o.b. plants — $7.00 to $9.00

SULPHUR: Long ton, F.o.b. Hoskins Mound, Texas — $25.50
Export — $30.50

LONDON METAL AND MINERAL PRICES

		December 17, 1955 Per Long Ton	USA Equivalent cents per pound[1]
COPPER:	**Electrolytic spot**	£397 Os Od	49.62¢
LEAD:	**Refined 99.9%**	£113 Os Od	14.12¢
ZINC:	**Virgin, 98%**	£ 98 Os Od	12.25¢
ALUMINUM:	**Ingot, 99.5%**	£171 Os Od	21.37½¢
ANTIMONY:	**Regulus, 99.6%**	£210 Os Od	26.25¢
TIN:	**Standard, 99.75%**	£835 Os Od	104.38¢
TUNGSTEN:	**Long ton unit, 26%**	$37.10 per unit	

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

Stassen Heads Top Level Speakers at National Western Mining Conference in Denver, Feb. 2-4

The National Western Mining Conference is to be held in Denver, Colorado on February 2, 3 and 4. Top-flight speakers on every phase of mining are being scheduled to appear on the program by Denny Viles, vice president, Vanadium Corporation of America, and chairman of the convention committee.

Harold Stassen, special advisor for the Administration on disarmament and the man President Eisenhower has chosen to help the world end war, will deliver a major address on "Atoms for Peace," in which he will speak on the White House level. He will tell how "The United States pledges its determination to help solve the fearful Atomic dilemma—to devote its entire heart and mind to find the way by which the miraculous inventiveness of man shall not be dedicated to his death but consecrated to his life."

Dr. C. E. Larson, National Carbon Research Laboratories, will give the convention an insight into happenings at the Geneva Atomic Energy Conference.

Jesse C. Johnson, director of the Division of Raw Materials of the United States Atomic Energy Commission, will bring the uranium industry up to date on policies of the Commission regarding raw materials.

Uses of uranium will be emphasized by many leading industrialists from various sections of the country including: John J. Hopkins, President of General Dynamics Corporation of New York; O. B. Falls, Jr. of General Electric Company, "Atomic Power Equipment Marketing"; Eugene B. Hotchkiss of Vitro Corporation of America, "The Glittering Opportunities of a Poly-Metallic Nuclear Mining Industry"; and General Patrick J. Hurley, "Atomic Power and Uranium as a Source of Power."

Other uranium topics to be discussed by leading authorities include: The famous Happy Jack mine which will be portrayed in color by Davis C. Holer; "Definition of Terms" by Colonel T. R. Gillenwaters; "Concentration of Low Grade Uranium Ores," a subject of tremendous interest, which will be analyzed by Fred Brinker, chief metallurgist of the Vanadium Corporation of America; A paper on "Critical Areas for Uranium Exploration on the Colorado Plateau" presented by R. Maurice Tripp of Dallas, Texas; "Difficult Problems of Mining on the Colorado Plateau" by Frank A. McCory of Moab, Utah; "Uranium in Australia and Africa" by Bernard M. Bench; Hugh C. Colman on "The Origin of Uranium at Haystack Mountain Mines in New Mexico"; George E. Morehouse of Trace Elements Corporation who will explain the results of that company's uranium activities in Moffat County, Colorado; and a paper entitled, "Adjusting Hardrock Mining Techniques to the Production of Uranium" to be delivered by Gordon Miner of Homestake Mining Company.

T. O. Evans, chief mining engineer of the Haystack Mountain Development Company of New Mexico, will preside over a Uranium Section.

Uranium will be only a small part of the three-day program. A wide variety of metals and minerals experts will discuss the following in their papers:

"Aluminum and the New Plants in Montana" will be explained by Russell Caples, president of Anaconda Aluminum Company. "Research as an Aid to the Mining Industry" will be discussed by Edwin H. Crabtree, Jr., of the Colorado School of Mines Research Foundation. "Airborne Exploration and the Numerous Phases of Scientific Applications to Mining" will be brought out by Russell Cutter of Trace Elements Corporation. The Under Secretary of the Interior, The Honorable Clarence A. Davis, will address the convention on "Government Policy in the Mining Industry." Robert E. Sullivan, Dean of the Montana State University, will talk on "Organization and Financing of Mining Ventures."

Frank Breyer, leading authority on analytical costs, will discuss "Increased Costs of Mining" and establish reasons why the mining industry is justified in establishing higher metal prices.

Jess Larson of Washington, D. C., will act as Toastmaster of the Uranium-Gold-Silver Banquet. The Convention will close Saturday night, February 4, with the "World Famous" Sowbelly Dinner. On the same evening the ladies, who will have several luncheons during the Convention, will hold their annual Sourbelle Dinner which attracted a capacity attendance last year.

Rico Argentine Mining Company's new sulphuric acid plant at Rico, Colorado is now producing approximately 200 tons of 100 percent sulphuric acid per day. The acid is being sold to the Monticello, Utah mill of the *U. S. Atomic Energy Commission*, to the Naturita and Durango, Colorado mills of the *Vanadium Corporation of America*, and to the Shiprock, Arizona mill of *Kerr-McGee Oil Industries, Inc.*

Mine production on the *Phillipson Level* at the *Climax Molybdenum Company* mine, Climax, Colorado reached an all-time shift high three times in an eight-day period during November. The final record was made November 17 when the 36-man crew handled 1,110 cars during an eight-hour shift. This amounted to 9,095 tons of muck or nearly 253 tons per man shift. The present record on the *Storke Level* was established September 15, 1955 when a 16-man crew handled 1,087 cars of muck in one shift.

Rimrock Uranium Mines, Inc., Shreveport, Louisiana, changed its name to *Rimrock Tidelands, Inc.* at a recent stockholders meeting. H. L. Rowley was named president of the firm, and A. J. Nicoli will be in charge of the company's Rocky Mountain Division in Grand Junction, Colorado. The company has producing uranium claims near Meeker, Colorado. Stripping operations recently began on the *Lucky Boy* claims near Moab, Utah.

Silver Bell Mines Company may reopen the *Cariboo* mine near Ophir, Colorado, according to reports from the company. The mine, half-way between Ophir Loop and Old Ophir, is a former gold, silver, copper, lead, and zinc producer. The company has had a five-man crew at the property doing examination work.

Filing incorporation papers with the Mesa County, Colorado clerk last month were *Plateau Testing Laboratories, Inc.* and *U_3O_8 Exploration, Inc.* The latter group was incorporated by A. J. Hudspeth, James C. Gathright, and M. E. Bruce. Plateau Testing Laboratories is directed by Lowell M. Long, Claud D. Smith, and John L. Chapman. It will provide assay, testing, engineering, and technical services.

Colonial Uranium Company has changed its name to *Colonial Nuclear Industries*. The firm is working a uranium prospect with *McAlester Fuel Company* in Moffat County, Colorado, and has a joint venture with *Morgan Minerals Corporation* in Emery County, Utah. It recently negotiated an agreement to acquire a majority interest in the *Gold Prince & Mining Company* of Silverton, Colorado. The firm also has various thorium interests in the Colorado Plateau.

Lithium Corporation of America, Inc., Minneapolis, Minnesota, has put its South Dakota operations on a standby basis due to surplus inventories of raw materials. An earlier short supply of spodumene was overcome by development of new sources and inventories show a reserve of several months is available. Lithium Corporation operates chemical manufacturing plants in St. Louis Park, Minnesota and Bessemer City, North Carolina. At the same time the corporation announced the installation of additional manufacturing facilities for the production of metal to meet rising contractual demands.

Western Minerals, Inc., Rapid City, South Dakota, was issued a charter of incorporation at Pierre, South Dakota. Directors are Orman Wiley and John Douglas, Rapid City, and Henry Meier, Sturgis.

Kennecott Copper Corporation's Utah Copper division produced 468,200,000 pounds of copper in 1955, compared to 423,066,857 pounds produced in 1954. This increase was despite a 47-day strike that cut production by an estimated 70,000,000 pounds. Copper ore mined and milled amounted to 27,780,000 tons. Approximately 50,458,000 tons of waste were removed. Ore mined in 1954 was 24,079,400. In addition to copper the division produced 24,987,000 pounds of molybdenite; 1954 production was 22,297,572. Major equipment purchased during the year included five 7-yard shovels, four electric locomotives, and 50 40-yard dump cars.

Boyles Bros. Drilling Company, Salt Lake City, Utah, is sinking a 600-foot shaft for *E. L. Cord and Associates*, Reno, Nevada, on the *Cord Group* of uranium claims located at the north end of the

Big Indian district, San Juan County, Utah. The three-compartment shaft will be completed early this year. The drilling firm has completed shafts for *Climax Uranium Company, Tar Baby* and *North American* uranium companies in recent years. V. L. Stevens is manager of the mining department.

Vitro Uranium Company, a division of *Vitro Corporation of America*, has signed a contract with *Hidden Splendor Mining Company, Atlas Corporation* subsidiary, to mill a minimum of 5,000 tons of Hidden Splendor ore monthly. The contract will run for the duration of Vitro's milling contract with the *United States Atomic Energy Commission* or until March 31, 1962, whichever is earlier. Hidden Splendor is operating the former *Delta* mine of Vernon Pick in Emery County, Utah.

New Park Mining Company is engaged in sinking a three-compartment shaft to a depth of 2,250 feet as part of its development program at Park City, Utah. The shaft has been bottomed at 2,065 feet while crews begin cutting stations. The firm hopes to have four or five levels ready for mining from the Pearl, West Mayflower, and No. 3 lead-silver-zinc fissures by July 31. Exploration is also being carried out 800 feet west of the main shaft at depth to find the contact of bedded ore mineralization cut on the 1,600-foot level. New Park is also conducting a geophysical search of the Vallejo area, in which New Park controls more than 10,000 acres. W. H. H. Cranmer, Salt Lake City, Utah, is company president.

Federal Uranium Corporation, Salt Lake City, Utah, has sunk the *Poison* shaft west of the *Farmer John* mine near Marysvale to explore a horizon containing production veins in property immediately to the east of the property. Some drifting has been done from the 250 level, but W. D. Nebeker, Jr., president, reported in December that work had been stopped some 50 feet short of the company's objective pending settlement of a boundary dispute.

Hecla Mining Company, which recently started regular uranium shipments from the Radon property in the Big Indian district, expects to reach full production of 250 tons daily this month. Ore reserves are estimated to last about four years at this rate. Net returns are expected to be about $70 a ton. Hecla is operating the property under an agreement with *U & I Uranium Company* which recently was merged with *Federal Uranium Corporation*.

Work has begun on the 288-foot incline shaft on *Utaco Uranium, Inc.'s Allen No. 2* claim in Red Canyon, San Juan County, Utah.

Salt Lake Tungsten Company put its new high purity ammonia para-tungsten unit into production in December. The plant, located near the company's main refinery in Salt Lake City, Utah, produces a material which is easily converted to powdered tungstate. It bypasses several "end refining" operations required in processing of artificial scheelite. Blair T. Burwell, Jr. is manager.

Continental Uranium, Inc., Chicago, Illinois, has acquired a group of 12 uranium claims in Colorado and approximately 1,100 acres of leases in Utah. The firm has been negotiating with the *United States Atomic Energy Commission* for establishment of a mill near La Sal, San Juan County Utah. Continental Uranium has two producing properties in the Big Indian mining district.

Among new uranium corporations opening offices in Salt Lake City, Utah is *Hiskey Uranium Corporation*. Everett L. Holbrook is president and McKay M. Loveland is vice president.

Moab Uranium Company and *Sovereign Uranium Gas & Oil Company* have begun joint venture development of 32 mining claims in Mineral Canyon, near the Green River west of Moab, Utah.

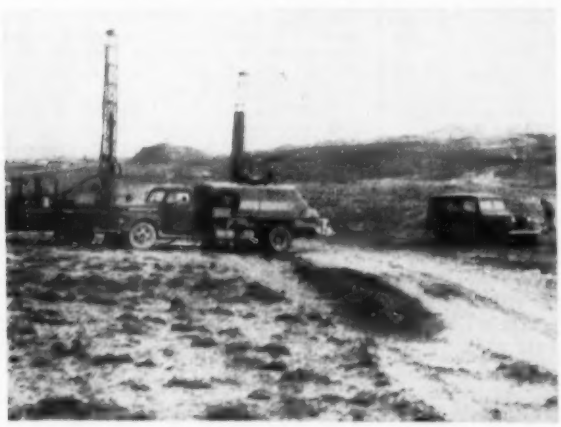
The *Defense Minerals Exploration Administration* has approved a zinc-lead project loan with a contract value of $301,930 for *United States Smelting, Refining, and Mining Company*, Salt Lake City, Utah. Government participation will total $150,965.

Material Service Corporation of Chicago, Illinois, is reportedly looking toward opening of a $2,000,000 dolomite mine and processing plant in Tooele County, Utah. The refractories operation will serve the western United States. The Tooele County deposit developed by *Geoprofessional Services, Inc.*, Salt Lake City, Utah is of high quality and led to the consideration of the operation in the area by the Illinois company.

Operations have started at the Green River, Utah properties of *The American Energy Corporation*, Moab. The claims, known as the *Lucky Valley* claims, contain ore in the Brushy Basin member of the Morrison formation. So far, the blocked out ore is estimated to be more than 1,000 tons. Victor J. Nelson is president of the firm, and Harry B. Hollingsworth is geologist.

Joy Drilling Company is contract drilling two holes for *Oil Securities and Uranium Company*, Salt Lake City, Utah. The potash prospect being drilled is located north of Seven Mile Anticline near Moab, Utah.

Development Work Continues at Lucky Mc, Continental Uranium Mines



Two significant uranium operations now underway on the Colorado Plateau are the large drilling campaign on the Lucky Mc Uranium Corporation property in central Wyoming and the stripping operation at Continental Uranium, Inc.'s Rattlesnake mine near Moab, Utah. The photograph above shows progress at Lucky Mc in blocking out sufficient ore to justify erection of a uranium processing mill, for which United States Atomic Energy Commission approval is now being sought. The two drilling rigs shown are furnished with air by the large truck-mounted compressor in the foreground. Man at right is engaged in probing and logging radioactivity in a completed drill hole. Under an option agreement between Lucky Mc and Utah Construction Company, the construction firm is handling mining operations of the Wyoming company and, it is believed, will eventually hold 60 percent interest in Lucky Mc. At the Deep North ore body of Continental Uranium, Inc.'s Rattlesnake mine, large-scale stripping operations are continuing. Photograph above is looking toward the lower west wall of the pit. By the end of September, between 900,000 and 1,000,000 cubic yards had been stripped by Daniels Construction Company, with an average of 10,000 yards per shift. Overburden totaling 2,500,000 yards of the Brushy Basin member, Morrison formation, will eventually be removed, exposing the Salt Wash member. Selective open-pit mining will then be employed to recover ore, which is concentrated in a relatively small, trapizoidal-shaped area measuring approximately 450 feet long by 300 feet wide. The Rattlesnake is operated by Woodmont, Inc., a wholly owned subsidiary of Continental Uranium. Continental is now negotiating with the AEC for construction of a 200-ton-per-day processing mill near LaSal, Utah.

ROCKY MOUNTAIN

WYOMING

North Central Mining Company, an associate of *San Juan Uranium Company*, Denver, Colorado, shipped the first load of uranium ore from the Pumpkin Buttes, Wyoming area since its reopening to mineral development to the Riverton, Wyoming AEC buying station in November. San Juan had signed an agreement for ingress rights with Earl Brown, Wyoming rancher who owns surface rights to 35,000 of the total 46,440 acres in the area, last September. The firm had prospecting crews working in the area for several weeks, although they had to wait until November 17, opening date for mineral entry, to stake claims. A 100-man crew was ready to begin immediate development work, and the company was the first to begin actual mining operations. William Chadwell is president of the firm, and Everett Alloway, Denver, Colorado, is mining superintendent.

An initial shipment of uranium ore has been made from the Sheep Mountain area near Lander, Wyoming by the *Uranium Corporation of America*.

The *U. S. Bureau of Mines* has not come up with a commercial find of selenium after a year's prospecting in Wyoming, the head of the Intermountain Experiment Station reports. However, several mining companies have reported selenium mineralization on their Wyoming properties. *Vitro Minerals Corporation* reports small depositions in its Gas Hills properties, and *Lucky Mc Uranium Corporation* has stockpiled several hundred tons of high selenium ore. *Shawano Development Corporation* reports a sizable reserve in the Baggs area in southern Wyoming, and *Kerr-McGee Oil Industries, Inc.* has also reported selenium on its Wyoming properties. All of these reports consist of small or low-grade deposits, however, and exploration by the Bureau of Mines is continuing.

Kenneth J. de los Rios, mining engineer and operator, Los Angeles, California, has purchased two lithium and rare earth properties in Fremont and Natrona counties, Wyoming from a Lander, Wyoming group. Involved in the transaction were the *Whippet 1-9* claims on Bridger Mountain, Fremont County, and the *Marvel 1-7* claims on Black Mountain, Natrona County. It is reported that Mr. de los Rios plans to construct a mill on each of the two properties for extraction of lithium, tantalum, beryllium, columbium, mica, and rare earths.

Increasing importance is being attached in the Gas Hills uranium area of central Wyoming to a blue clay, or mudstone, type of uranium ore now being mined by several producers, including *Lucky Mc Uranium Corporation* and *Vitro Minerals*. A large tonnage of the ore is being uncovered. It is reported uniform in U_3O_8 content, although it is much more difficult to crush and sample than the sandstone ore.

The *Mack-Lang Uranium Corporation* has moved its offices from Lander to Riverton, Wyoming. The company recently obtained leases from *Flanders-Langford Mining Company* that cover several thousand acres of state land and claims.

Stripping Work Begins At Pima Copper Property

Actual stripping has been started at the copper property of Pima Mining Company, near Tucson, Arizona. The huge earth-moving job is being handled by Utah Construction Company, one of the three major owners of the Pima property. The other controlling interests are the Cyprus Mines Corporation and Union Oil Company.

The job calls for the removal of the overburden to a depth of 200 feet, and will require at least a year to complete. In the meantime, a flotation plant with a 3,000-ton daily capacity will be erected.

Pima Mining recently received authorization from the Office of Defense Mobilization for rapid tax write-off of 75 percent of an $8,873,000 investment in converting the underground mine to an open-pit operation. This authorization permits the amount to be depreciated for tax purposes in five years instead of the usual 25 years. Paul W. Allen of Los Angeles is vice-president and general manager of Pima Mining Company; Drexel Spaulding of Tucson is resident manager.

J. H. Cazier and Edgar A. Scholz have sold their interest in the *Black Pearl* mine to *Hillside Mining and Milling Company* of Bagdad, Arizona. Shaft sinking operations already have started toward establishment of a 125-foot level below the present adit level. Ore from the Black Pearl will be transported to Hillside's Tungstona mill for treatment. Mr. Cazier and Mr. Scholz have had the Black Pearl under development for the last four years, and have made intermittent shipments of tungsten concentrates. Last spring the mine was granted an exploration contract by the Defense Minerals Exploration Administration, total value of the contract being $127,285.00 with the government's participation amounting to $95,463.75.

The *Fontaine Cupel Mining Corporation* has taken over several groups of claims in the Stockton Hill mining district near Kingman, Arizona, and has started to reopen some of the old workings. Among the groups acquired are the *De La Fontaine, Prince George, C.O.D., Cupel,* and *Gates*. Metal values are in lead, zinc, gold, and silver. Walt Simmons of Kingman is superintendent in charge of the work, employing a crew of 12 men.

The *L. and M. Mining Company*, headed by Gordon Smith of Gabbs, Nevada, has taken a lease and option on the *Tom Reed* mine near Oatman, Arizona. Drilling underground has been started.

McFarland & Hullinger are presently leasing the old *San Xavier* zinc-lead mine near Tucson, Arizona owned by the *Eagle-Picher Company*. Present production is about 100 tons of lead ore daily, on a one-shift basis. Jerry Irwin is mine engineer.

Boswell-Frates Company of Tulsa, Oklahoma has taken a lease-option on 60 uranium claims in Tonto Basin area of Arizona. A down payment of $10,000 was made, and royalties of $1,100 per month were guaranteed with payments to begin within eight months. The buyers agree to do 2,000 feet of drilling on each of three groups of claims. Included in the agreement are 17 claims in the *Conway* group, 27 claims in the *Uranium-Sweet Sue* group, and 16 claims in the *Fair View* group, all located in the Green Back Mountain area north of and east of Tonto Basin. If the buyer exercises his option, a total of $1,270,000 will be paid to the owners—Ed, Irl, Clarence, and E. C. Conway.

Lewisohn Copper Corporation is mining copper ore from the *King Exile* mine in the Helvetia district near Tucson, Arizona. Exploration is under way on adjoining claims acquired recently.

Banner Mining Company is erecting a new headframe at its *Copper Glance* mine in the Twin Buttes district of Arizona. Also under construction are new surface buildings, including a change house and hoist house. Development work is to start shortly from the Copper Glance to the *Bullion* claim.

American Exploration & Mining Company, a California subsidiary of the Canadian firm, *Placer Development Limited*, reportedly is examining copper and lead-zinc properties in Arizona.

Sixteen uranium claims in the Workman Creek area of the Sierra Ancha mining district north of Globe, Arizona have been acquired by the *Blue Bonnet Uranium Corporation* of Houston, Texas for $600,000. Production is already underway from the *Lost Dog* Mine, says Karl M. Grau, president of the firm.

Rare Metals Corporation of America expects to have its new uranium mill at Tuba City, Arizona in operation by April. Ore buying and sampling facilities should be operating early this month. The firm has completed 300,000 feet of drilling for uranium ore in the area since July 1. Stripping has been completed on two of the properties which will be mined by open pitting. Some 8,000 tons of ore from Rare Metals' mine have been stockpiled near the site of the concentrator. Rare Metals is a subsidiary of *El Paso Natural Gas Company*.

Twin State Uranium Company of Winslow, Arizona reports that it has sold its claim near the Navajo Indian Reservation border to the *Gibralter Uranium Oil Company* of Grand Junction, Colorado. M. K. Robinson and M. J. O'Haco, officials of the firm, said that the purchase price was "not to exceed $5,000,000."

The *Condor Mineral Exploration Company* has recently been organized to develop a group of copper and uranium claims on the Papago Indian Reservation in Arizona. Incorporators are Donald Cohn of Lincolnwood, Illinois; Fred Racette and Vincent Pokrak, both of Chicago. The firm also intends to broaden the scope of its activities by developing other properties on a royalty basis.

Cherry Creek Uranium Corporation is diamond drilling on a group of *Red Fox* claims in China Springs Canyon, Sierra Ancha mining district, Arizona. The firm has 14 claims in this area, and an option on 26 others.

Arizona Research Consultants, Inc. has completed a report for the *Arizona Development Board* on a number of selected natural resources in the state of Arizona. The board is a newly established state office designed to assist and promote the industrial development of Arizona. Copies of the book are available without charge. Write to the Development Board care of the Arizona Research Consultants, Inc., 3802 North 14th Place, Phoenix.

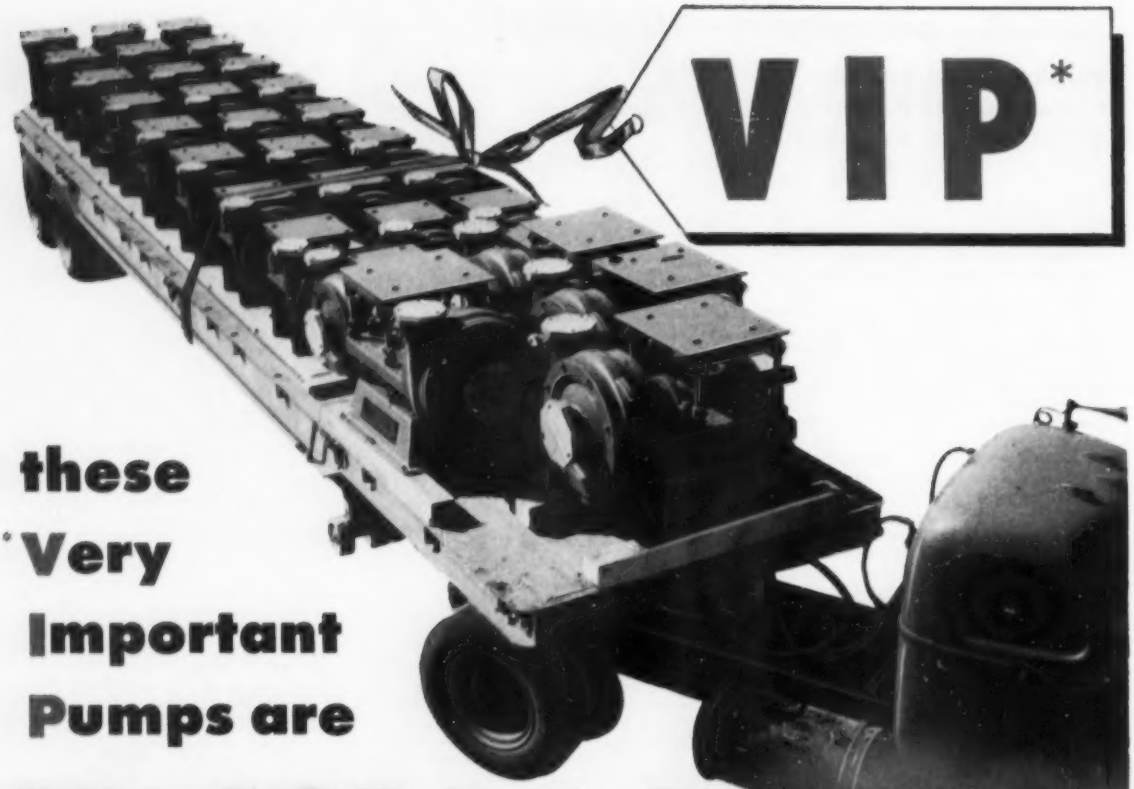
A United States Bureau of Mines report on Arizona's chrysotile asbestos deposits has been released to the public. The deposits described are scattered over 2,000 square miles of rugged mountainous country, and many of the mines are on steep canyon walls. The asbestos is found in thin, discontinuous veins, and in the average mine 30 to 40 tons of waste rock must be removed to produce one ton of commercial asbestos. Mining and transportation costs, therefore, are high and annual output is relatively low. From the first recorded production in 1900 through 1953, total production of all grades is estimated at 30,000 to 35,000 tons.

A photomosaic map showing radioactivity anomalies detected during an airborne survey of an area of 1,300 square miles in the Painted Desert region of Coconino and Navajo counties, Arizona has been released by the Secretary of the Interior. The survey was made by the United States Geological Survey in February 1954 as part of a program of airborne reconnaissance for radioactive materials conducted for the Atomic Energy Commission.

Standard Mining Corporation has purchased the *Penn* mine in Calaveras County, California. One of the most famous old mines in California, it was first opened up in 1861, and as recently as 1946 produced 12,000,000 pounds of zinc during a three-year period, along with gold and copper values. It had a prior production record amounting to as much as 79,000,000 pounds of copper, not including the gold, silver, and zinc produced. Standard Mining, under William A. Hooton, has started reopening of certain workings between the 300- and 400-foot levels, and between the 600- and 700-foot levels. Limited production is expected to start soon. Subsequently, a larger exploration program is planned for unexplored portions of the mine.

Idaho Maryland Mines Corporation has received an additional loan from the Defense Minerals Exploration Administration to develop the extension of the 900 level tungsten ore shoot on the 700 and 1100 levels of its mine at Grass Valley, California. Bert Austin, president of Idaho Maryland, reports that the ore shoot has now been developed for a length of more than 400 feet. The company's new mill, with a capacity of five tons per hour, will be in operation shortly.

The contract for preliminary stripping at *Pacific Coast Borax Company's* open pit development at Boron, California has been awarded to *Isbell Construction Company* of Reno, Nevada. The contract calls for removal of 10,000,000 tons of overburden from the borax deposit. Open-pit mining operations are scheduled to start later this year. Work presently underway includes preliminary grading of building sites, and survey work for location of various buildings.



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The contractors, a joint venture of *Southwestern Engineering Company* and *Ford J. Twaits Company*, are installing a concrete mixing plant for their own use.

The *United States Atomic Energy Commission* is aiding the search for uranium in Kern County, California with a diamond core drilling program. The U.S. Bureau of Mines operates the rig on a contract basis for the AEC. Two holes were drilled on the *Pioneer* claims at Bird Springs Pass, 10 miles southeast of Weldon, California, and 45 miles east of Bakersfield and enough mineralization was found to warrant sinking of a new shaft. Earl McKay of Bodfish located the Pioneer claims about 1½ years ago. They are now leased to *Lucky Seven*, a partnership formed by seven employes of *Bankline Oil Company*. First core hole drilled went to 294 feet; the second bottomed at 195 feet. Both were drilled to crosscut veins. The drill is capable of going to a depth of 2,500 feet. Next assignment will be additional drilling on nearby claims owned by *Bird Springs Mining & Development Company* of Bakersfield.

West End Chemical Company announces the discovery and acquisition of a new, exceptionally pure limestone deposit in the Argus Range, Inyo County, California, just north of the present plant location in Westend, California. Company officials are anticipating transferral of their present quarry operations to the new site in the immediate future. Under consideration is the installation of a rotary lime kiln using natural gas as fuel. Top capacity of this new kiln will be 170 tons of lime per day. The carbon dioxide resulting from the rotary kiln operation will be used in the carbonation process, thus eliminating the vertical lime kiln operation. According to company officials, the lime from the rotary kiln will be of the highest quality and will be marketed as pebble and hydrated lime. Due to the recent growth of plant production facilities, West End also announces the moving of executive offices to larger quarters in the new, modern 1956 Webster Building, Oakland 12, California.

Superior Gypsum Company has started operations in Kern County, California. A $100,000 completely automatic crushing and screening plant has been erected. The gypsum rock will be dug with a bulldozer, then pushed through a feeder into the primary crusher. After rejects are separated, the remainder is recrushed and rescreened to insure uniform grade of product. Albert Chanley, owner of the firm, discovered the deposit several years ago. He has leased the mill site from the Sumner-Wreden estate.

Southern Pacific Railroad's eight-year exploration program is well underway. Geologists and geophysicists have been in the field for six months under the direction of Lawrence B. Wright, chief of exploration. The company plans over the eight-year period to explore the 5,200,000 acres which it owns or on which it holds mineral rights. There are four two-man teams, each following the weather. They started in the Mojave Desert of California; moved to Lovelock, Nevada when the desert grew too hot; then to the northern California coast near Dunsmuir. The surveys thus far have pointed out that diamond drilling is warranted in certain areas.

Minerals Engineering Company of Grand Junction, Colorado has signed an option contract with *Comstock Uranium and Tungsten Company* to develop a tungsten prospect near Mina, Nevada. Minerals Engineering will take over exploration and production for a 75 percent share in the profits and Comstock Uranium will receive the remaining 25 percent. An estimated 1,000,000 tons of low-grade tungsten ore has been disclosed by initial core drilling. This is being checked by additional drilling now in progress. If the deposit merits it, a mill will be built on the property; concentrates will be shipped to the *Salt Lake Tungsten Company* refinery, in which Minerals Engineering holds a 50 percent interest.

United Mercury Corporation reports that a recent discovery of mercury in one of its mines has caused a shift in operations from uranium to mercury. This newly discovered mercury ore reserve in the firm's *McCoy* mine near Battle Mountain, Nevada will double the original estimate. A new kiln and condensing plant capable of processing 125 tons a day were recently completed at the mine.

Eagle-Picher Company has retained *Kaiser Engineers* to investigate and evaluate diatomaceous earth deposits near Lovelock, Nevada.

An exploration and development program is underway on the Big Bob, Lucky Boy, and Lucky Girls veins in the Edgemont mine, operated by *Edgemont Mining Company* near White Rock, Elko County, Nevada. Work will proceed through the winter on a two-shift basis.

Fresnillo Company is reported to be considering resuming operations at Round Mountain, Nevada, through its subsidiary *Round Mountain Gold Dredging Corporation*. The Round Mountain firm has long-term leases on properties of *Nevada Porphyry Gold Mines Inc.* and has developed some 40,000,000 yards of placer gravel by drilling and shafts.

Western Mercury and Uranium Corporation recently acquired 21 mercury claims 145 miles northwest of Las Vegas in Lincoln County, Nevada. The ore is highly disseminated and occurs like salt and pepper in huge 100-foot mounds of soft moist rhyolite. Present equipment in operation includes a bulldozer, a 400-foot, double-drum dragline, and an air slusher dragline. The company plans to install a Gould rotary furnace when sufficient ore is stockpiled.

The *Uranium and Federated Minerals Company* of South Dakota has acquired eight claims including the old *Silver Leaf* mine in the Hannapah district about 20 miles east of Tonopah, Nevada and has dewatered the 285-foot shaft. Actual mining and development work will now be carried out, probably on the 200- and 285-foot levels. The property has a

good silver and gold production record, and has not been mined in 20 years. It was formerly held by the late Ben Richardson and Jess Crain.

Surface and underground drilling has started at the *St. Anthony* tungsten mine leased by David Sayre and associates from Sanford A. Bunce. The mine is a short distance from Toy, 15 miles west of Lovelock, Nevada.

NEW MEXICO

The *Manganese Corporation of Arizona* has announced a $1,500,000 expansion at its mine and mill southwest of Socorro, New Mexico. The mill flow sheet will be redesigned to produce a higher grade concentrate which will be shipped to Phillipsburg, Montana, and Pueblo, Colorado.

The *United States Smelting, Mining & Refining Company* plans to resume mining and milling operations at Bayard, New Mexico, if leases on three shafts in the area are consummated.

Cougar Mining & Development Company has registered a new manganese mine near Socorro, New Mexico and is discussing plans for a mill to process the ore.

Aztec Copper Mines, Inc. will reopen a property of the *Copper Hill Mining Company* in Taos County, New Mexico where the last activity was in 1907.

Strong and Harris of Vanadium, New Mexico have filed for reopening of the *Black Tower* manganese mine at Cliff.

Verde Mining Company of Silver City, New Mexico is planning to mine copper and uranium in the old mining camp of Pinos Altos, which has been idle for 50 years.

A one-fifth interest in the *Hofhein* mining properties near Bland, New Mexico has been acquired by *Victory Exploration & Mining Company*. Gold and silver deposits have been blocked out, with some indications of uranium.

Swan-Finch Oil Corporation has acquired 85 leases on uranium oil-bearing properties in the Poison Canyon near Grants, New Mexico. As a part of the transaction, Swan-Finch took over all of the stock of the *Colamer Corporation* which owned the leases.

Chief Manganese Corporation of Albuquerque, New Mexico has sold a 51 percent interest in 10 manganese claims 23 miles southwest of Socorro, New Mexico to *Trans-National Minerals, Inc.* of Dallas, Texas. Trans-National also holds an option to buy the remaining 49 percent.

United States Potash Company is undertaking a $3,500,000 expansion program at its Carlsbad, New Mexico property. When completed, a 20 percent increase in production will be effected. Present facilities are being increased and modernized, while production bottle necks are being eliminated.

Rio de Oro Uranium Mines, Inc. has acquired the *Dunn Brothers'* interest and mining contract in the *Mid-Continent Exploration Company's* original Ambrosia Lake ore body, northwest of Grants, New Mexico. Rio has bottomed its shaft at a depth of 390 feet, and is installing equipment. Production is expected to start shortly.

Pacific Uranium Mines Company of Beverly Hills, California reports it has located a large uranium ore body in preliminary drilling in the Ambrosia Lakes area of McKinley County, New Mexico.

The old *Henry Clay* copper mine near the *Atwood* mine in the Lordsburg district of New Mexico has been reactivated. The property had not been worked since 1939.

General Chemical Corporation has closed its fluorspar mill near Deming, New Mexico. Established in 1933, the mill has been processing about 2,000 tons of ore monthly.

The *Manganese Corporation of Arizona*, which purchased a manganese mine and mill at Socorro, New Mexico from John Emmons in 1954, has this year installed new equipment and increased production.

The *Iola Uranium Corporation* has been formed to develop property in New Mexico. The company owns 59 unpatented mining claims in Socorro County, and holds state mining leases on 1,430 acres in Grant County, 2,040 acres in Hidalgo County, and an additional 10,777 acres in Socorro County. A limited amount of core drilling has indicated uranium and immediate plans call for additional extensive exploration and development. Offices of the firm are in Denver, Colorado and in Chicago, Illinois.

The *Onego Corporation* of Santa Fe, New Mexico and Uniontown, Pennsylvania, has announced a find of monazite sands 17 miles southwest of Santa Fe amounting to an estimated 4,000,000 tons. Assays have shown, according to Edward J. James, president, the presence of other rare earths including gallium, titanium, lanthanum, ytterium and ytterbium. The Onego claims, known as the *Lost Creek* claims, have been worked periodically since early Spanish colonial times for gold and silver.

International Minerals & Chemical Corporation's potash division, at Carlsbad, New Mexico recently increased its production of potassium sulfate to 400 tons per day through changes in the refinery and chemical plants. This included installation of a new clarifloculator, dryer, boiler, crystallizer, centrifugal filter, and Raymond mill. Also the company put 125 new mine cars in service underground.

TEXAS

Atlas Corporation, headed by Floyd Odlum, is said to be dickering with the *Universal Service Corporation* for their holdings in the Lajitas area of southern Brewster County, Texas.

Sheffield Steel Division of the *Armco Steel Corporation* will build a complete sintering plant and ore bedding system at its plant in Houston, Texas. The new plant will be capable of producing approximately 1,400 tons of sinter daily. It will include ore screening and storage facilities, sludge recovery equipment, trough-type and drum-type pug mill equipment and sintering machine. The bedding plant will blend three types of ore for the blast furnaces.

A uranium find has been reported in the Burnet area of central Texas. The discovery was made by James R. Ledger on the James Hohanson ranch about 80 miles from Austin.

American Lithium Chemicals, Inc., a subsidiary of *American Potash & Chemical Corporation*, has started operation of its new chemical plant at San Antonio, Texas. The plant will manufacture lithium chemicals from lepidolite brought in from the *Bikita* mine in Southern Rhodesia. American Potash owns 50.1 percent of American Lithium Chemicals, and 21.25 percent in *Bikita Minerals (Private) Ltd.* Bikita, in turn, owns the balance of stock remaining in American Lithium.

Wright, Clark & Senkel, Inc., rotary drilling contractors of Graham, Texas, are checking the 3,000 acres of property they hold in southern Brewster County for cinnabar possibilities.

The *Lone Star Mercury Inc.* near Terlingua, Texas has purchased the buildings and equipment of the old *Study Butte* mine. Heavy timbers and two large rotary furnaces will be moved to the Lone Star property. When the three furnaces are in operation Lone Star's capacity will then be 100 tons a day of mercury. Another vein has been discovered on Lone Star's property, this one on the side of the mountain to the east of the Louisa mine where a bonanza strike was recently made. The new find appears to be a part of the Louisa's ore body. A tunnel is now being dug into the side of Tres Cueves Mountain.

Montana Iron Mine Will Ship in 1956

A new Montana mining firm will begin shipping iron ore in 1956 through the Duluth-Superior harbor in Minnesota. Organizers of the Young-Montana Company report that between 75,000 and 100,000 tons of ore will be mined this year from the leased holdings about 75 miles southeast of Great Falls, Montana.

Estimated proven reserves are set at about 1,000,000 tons, and, according to E. A. Young, president, the reserves may be even higher. The ore is on the Running Wolf Range in the Lewis and Clark Forest Reserve. It is of the Bessemer lump type, averaging 60 percent natural iron and will be mined by open pitting.

The firm's president is also head of two Minnesota iron range mining companies —the Haley-Young Company and the E. A. Young Company. McCabe, Clure, Van Evera and Donovan, a Duluth law firm, is counsel of the Montana mining firm. Arthur Clure is secretary-treasurer. Joseph Lovallo of Mountain, vice president, will be in direct charge of the project.

According to Mr. Young, freight rate difficulties had prevented earlier development of the Montana property. The rates have been ironed out now and the ore will be shipped over the Northern Pacific Railroad.

A five-man crew is developing a tungsten vein at *Salmon River Scheelite Corporation's* property on Thompson Creek near Clayton, Idaho. The Wilcox sawmill on the Yankee fork of the Salmon River has been moved to the mine to cut lumber for a camp and mill next spring. Jim Clutis is mine superintendent.

Stockholders of *Bunker Hill & Sullivan Mining and Concentrating Company* and of *Hecla Mining Company* have overwhelmingly approved a $7,000,000 exchange of assets. Bunker Hill acquired Hecla's half interest in the jointly operated *Sullivan Mining Company* for 275,000 new shares of Bunker stock. It acquired Hecla's 494,696 shares of *Pend Oreille Mines and Metals Company* stock for $2,102,458. Sullivan Mining Company owns Idaho's largest zinc mine, the *Star* at Burke, and an electrolytic zinc plant at Kellogg.

Roy Houghteling of Prichard, Idaho, H. S. Carpenter of Kellogg, and Clarence Damey of Cosmopolis, Washington have incorporated *Niagara Mining and Development Company* of Kellogg, with $300,000 capitalization.

Goldstone Mining Company has agreed to option its unissued treasury stock to *Tungsten Mountain Mining Company* of Nevada. Tungsten Mountain has agreed to loan Goldstone $25,000 from proceeds of a public stock offering to finance a raise from new lower workings of its gold property near Salmon, Idaho to old workings above. The loan would be convertible into 100,000 shares of Goldstone stock. Remaining treasury stock, if taken up, would finance construction of a mill building for mill machinery owned by Goldstone. B. W. Porter, Seattle, is president of both firms.

Smith Mines, Inc. at Lewiston, Idaho has been formed by Walter E. Smith of Kooskia, George E. Osborne and Lyle Wick of Spokane, and C. E. Cummings and Oscar Torgerson of Lewiston. Capitalization is $25,000.

International Mining and Machinery Company of Spokane has optioned a tungsten property adjoining the *Ima* tungsten mine in Lemhi County, Idaho. Carroll Wells, Salmon, is principal owner of the property. Mark Greenewalt, Spokane, is president of the mining firm.

Metropolitan Mines Corporation has an option on control of *Black Bear Silver Lead Mines,* and is financing the driving of a raise to open unmined ground in the old *Black Bear* mine near Burke, Shoshone County, Idaho. The work is being carried on by Black Bear Silver Lead of which Walter Ringel is president. Roy H. Kingsbury is president of Metropolitan.

Gold dragline operations on Medicine Creek in Idaho, a tributary of the St. Joe River, are planned for next spring by *McCulloch-Childers, Inc.* of Missoula, Montana. The firm has been testing the *Wade* placer group since early last summer. Equipment to be used will include a 2,000-yard washing plant, a 1½-yard dragline, a D8 bulldozer, and an electrical plant.

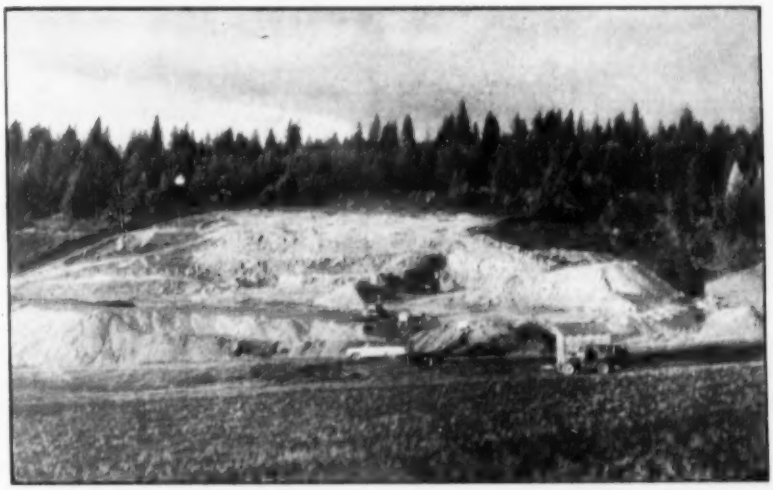
A ton of gold-silver concentrate per shift is being turned out by the Talache mill at Atlanta, Elmore County, Idaho. Ore is being mined at the property of *Talache Mines, Inc.,* by lessees Earl Moosman, Elmer Smith, Bill Sayko, Ben Brown, and W. Epperson. Concentrates are trucked to Boise and transferred to larger trucks for shipment to Seattle. George Alexander is in charge of milling. A. H. Burroughs, Jr., Boise, is company president.

St. Regis Mining Company of Wallace, Idaho, has been incorporated at Boise by James P. McCarver, Mullan, and Wilbur Boger and Albert H. Featherstone of Wallace, with $100,000 capitalization.

The *Idaho Bureau of Mines and Geology* has published an up-to-date survey of the state's mineral wealth under the title, "A Survey of the Mineral Resources of Idaho."

Golden Anchor Mining and Milling Company at last report was preparing to start milling operations at its gold-silver-lead-zinc property on Treasure Mountain in the Nigger Hill mining district, nine miles south of Elliston, Montana. A Diesel-electric generator was being installed to power a 50-ton mill combining the stamp and arrastra principles. Addition of other mill units are planned. An estimated 30,000 to 40,000 tons of ore have been blocked out. Three promising veins were uncovered recently in bulldozing a new road. Henry L. Newmiller of Elliston, formerly of Spokane, Washington, is president.

The *Anaconda Company,* now in the process of extending the Mountain Con shaft at Butte, Montana, another 300 feet in depth, has obtained a Cryderman shaft



Daybreak Uranium Mines with Bulldozer

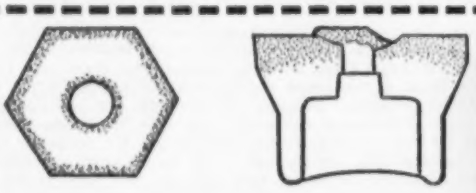
Stripping and open-pit mining operations of Daybreak Uranium, Inc. (shown above) have spread over an area of 900 by 250 feet in northern Spokane County, Washington. As can be seen in the photograph, the hill is being taken down in benches. Five shear zone type ore bodies have been uncovered to date. At last report the company had shipped 2,000 tons of autunite ore under "off-the-Colorado-Plateau" contracts with the AEC and had started on a 5,400-ton contract with Vitro Uranium Company of Salt Lake City, Utah. Vitro reports that it has been recovering 97 percent of the uranium oxide content of Daybreak ore, compared with an average of about 75 percent for other ores, and wanted to mix the Daybreak ore with others less amenable to concentration. Production so far has been from the Dahl lease in the Mount Spokane district. The company is also preparing another property for production—the Lewly lease on the Spokane Indian Reservation. Daybreak officials say that the Vitro Uranium has indicated it would build a uranium processing plant in the Spokane area if assured a minimum of 300 tons of ore daily for at least two years. Daybreak and several other independent mining firms with promising prospects for early production have agreed on a concerted effort to reach this goal at the earliest date possible.

To equal the fine drilling quality of Liddicoat bits, a drill rod has been developed to provide much greater footage and consequently lower cost per foot of hole drilled. The drill steel has been carburized to provide a stiff rod with a hardened section on the outside of the steel, and on the inside around the water hole. These hardened sections are supported by a strong ductile core.

Carburizing treatment has been designed to correct weaknesses existing in ordinary steel; namely, surface decarburization and low strength zones. By carburizing and hardening, tendency to fatigue failures, rapid wear in drill rods is lessened. The carburized rod incorporates mechanical and metallurgical refinements heretofore unavailable in drill steel.

⅞" Hexagon is the most popular section for feed-leg drilling. To secure the advantages of this cross section of drill steel, the Liddicoat bit is made in type 3 TEE CEE, 3-L and 3-H — all have the same socket size. Within the socket are forged six flats to match the flats on the rod. The bits are all interchangeable, which provides a type of bit best suited to ground conditions.

A trial order will prove the merit of this balanced combination to your entire satisfaction.



Dots in sketches indicate the hardened portions of cross section of drill rod and hardness pattern of Liddicoat bit.

WESTERN
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mucker for the project. Sinking of the 22- by 8-foot shaft had progressed nearly 100 feet at the time the new unit was purchased. The company expected to lower the mucker down the shaft and place it in operation shortly.

Basin-Jib Gold Mines, Inc. has sunk its shaft to below the 300 level at Basin, Montana. A station has been cut near the bottom and level driving has started. This project has been of particular interest to mining men because it is the first shaft in the United States to use the Cryderman mechanical mucker. Although large blocky granite boulders were encountered in the shaft muck, the machine was successful in handling these boulders.

A Certificate of Necessity has been granted to *Anaconda Company* for rapid tax-writeoff of 75 percent of $3,390,600 for copper ore concentrating facilities at Anaconda, Montana.

Gold Syndicate Corporation of Spokane, Wash., is acquiring six claims in the Cataract mining district between Butte and Helena, Montana. Uranium reportedly has been found in a dump made by prospectors searching for gold and silver some 50 years ago. Frank L lly is president.

Bob Nelson and Joe Irving have constructed a unique ore bin at the *Norwich* mine, 2½ miles west of Butte, Montana. The bin is made in the form of a long, lagging-lined, scraper trench similar to the scraper-trench system used by many mining companies for loading skips underground with wet-sticky ore. A scraper pulls the ore from the bin onto a ramp where the ore is dumped through a hole in the ramp into a waiting truck below. The advantages of this arrangement are reported to be: 1. minimizes the frozen ore problem which is always present in the severe Montana winter weather because most of the bin is below ground level; 2. requires no headroom for bin construction because since most of the bin is below ground level, a low headframe can be used; 3. allows ore to be blended and mixed for a uniform product in the long trench bin by the proper dumping of ores of varying grades; 4, capacity of the bin is large and the cost of construction is low when compared with a regular type of ore bin.

OREGON

The *Lakeview Mining Company*, in which the Thornburg brothers have a quarter interest, is developing the *White King* and *Lucky Lass* uranium properties, 15 miles north of Lakeview, Oregon. (See MINING WORLD, November 1955, page 84.) Also associated in the venture are Clint Murchison, Sid Richardson, and Perry Bass, multi-millionaire Texas oil operators. The same individuals also hold a similar interest in the *Gunnison Mining Company* which is developing the *Los Ocho* mining properties in Sagauche County, Colorado.

Mercury & Chemicals Corporation has acquired control of the old *Black Butte* mercury mines in Oregon which has an outstanding record as a former quicksilver producer. According to Richard P. Fischer, president of Mercury & Chemicals, the mine is remarkable in that the

ore is mined by underground methods rather than open-pit operations as might be expected because of its low-grade. Contributing to the low cost of mining here is the fact that the mine is developed through an adit, and ore and walls permit large shrinkage stopes. Mr. Fischer says that the firm has retained the services of Curt N. Schuette who has recommended construction of a new reduction plant. The latter is under consideration.

Autunite has been discovered in the Spokane Indian Reservation, southwestern Stevens County, Washington, about three miles south of the original *Midnite* mine discovery. *Northwest Uranium Mines, Inc.* of Wallace, Idaho opened the ore by bulldozing, following disclosure of an anomaly through airborne reconnaissance. At last report, a series of cuts in an area 1,000 feet long and 300 to 400 feet wide showed mineralization occurring beneath overburden in stratified beds of arkosic conglomerates, sandy claystones, clayey sandstones, and lignitic members in Nespelem sediments. Beds strike north and south, with a westerly dip of 15 to 20°. A vertical mineralized fault strikes slightly west of north. Maximum depth obtained was 20 feet. Northwest Uranium is the operating company for a joint venture of *Silver Buckle Mining Company, Fortune Mining Company,* and *Eastern Lead Corporation,* all of Wallace; *Pathfinder Uranium Corporation* of Salt Lake City; and *Stansbury and Associates* of Spokane. Dr. F. E. Scott of Wallace, president of Silver Buckle, heads the uranium firm. The vice president and general manager is Clark Wilson, Salt Lake City, vice president of New Park Mining Company.

Greenbluff Uranium, Inc. has let a diamond drilling contract to *S & S Enterprises* of Coeur d'Alene, Idaho, to develop an autunite ore showing uncovered by bulldozer in the Mount Spokane district, northern Spokane County, Washington. The firm has 4,500 acres under lease in Spokane and Stevens Counties. David M. Cohn of Tekoa is one of the incorporators.

Stardust, Inc. of Spokane has been incorporated as a Washington corporation with $150,000 capitalization. It has started exploration of leased ground in the Mount Spokane district. Clarence O. Mitchell is president; Thomas E. West, vice president; and R. G. Schimanski, secretary-treasurer.

Pend Oreille Mines and Metals Company has been adding to its vast holdings in the Metaline zinc-lead district of northeastern Washington by taking land withdrawn years ago for water power purposes and reopened to mineral entry recently by Congress. The land lies along both sides of the Pend Oreille River, upstream from the Z-Canyon power site. Jens Jensen of Spokane is president.

Other recent claim filers in Pend Oreille County, Washington were *Pilot Development Company* of Everett; Earl J. Adkins, Klamath Falls, Oregon; Bob DeVaughn, Bos Asbury, Jack C. Morgan, Norman LaVigne and Theodore R. Kellberg, all Spokane; Martin W. Atkins, Newport; Kenneth Dawson, Deer Park; James I. Miller, Priest River; Emma Madden, Mill Creek; Don W. Palmer, Chewelah; and F. P. LaSota, Metaline Falls.

Elk Uranium, Inc., has leased land in the Hunters mining district, Stevens County, Washington, from Evert B. and Maud F. Preedy. Some of the ground has been assigned to *Big Smoke Uranium, Inc.*, which has large holdings in the Spokane Indian Reservation. Martha Diehm of Spokane is president.

A. G. Lotze of Stevens County, Washington, has recorded the *Lead Center* mining claim in section 18, township 39, range 42, Northport mining district. James W. Heritage and J. A. Ledford have filed on a claim in the Bossburg mining district, Stevens County, Washington.

Approach of winter forced *Bear Creek Mining Company* to halt exploration at its *Glacier Peak* prospect in the Cascade mountains of Washington. Up to 25 men were employed during the summer season in geologic mapping, surveying, and coring 6,800 feet of diamond drill holes. Lowell B. Moon is mining geologist in charge of the Spokane district office of the *Kennecott Copper Corporation* subsidiary.

Showings of uranophane and autunite have been identified on mining claims in the Nancy Creek area, Ferry County, Washington, being developed by newly organized *Nancy Creek Uranium, Inc.*, of Coeur d'Alene, Idaho. The minerals were identified by U. S. Atomic Energy Commission personnel. Their extent has not been determined. Capitalization of the firm is $300,000. Incorporators included W. E. Neff, Spokane, and Harold McCoy, Kettle Falls, who staked the claims; John N. Hasstedt and Rees R. Hall Jr., Spokane; Sidney E. Smith and Peter B. Wilson, Coeur d'Alene, and James E. Harty and Simmie de Marre, Post Falls, Idaho.

Pend Oreille Mines and Metals Company, Spokane, Washington has recorded eight mining claim locations in Pend Oreille County. Other recent locations in the same county: *Highnoon Uranium Mines, Inc.*, Newport, 18 claims; *Pilot Development Company,* Everett, 17 claims; *Newport Mining and Leasing Company,* 74 claims; *Northwest Uranium Mines, Inc.*, Spokane, one claim; *Pacific Silica Company,* Seattle, one claim; George L. Howard, four claims; Bert Cable and R. J. Snyder, Spokane, eight claims; Norman S. LaVigne, Spokane, two claims; M. G. Melvin, Spokane, six claims; Cecil J. Durham, Spokane, three claims; David P. Weir, Rathdrum, one claim; Phillip Sheridan, William Walters and Clifford Egge, Spokane, two claims; Floyd E. and Orville Houchin and L. D. Bryant, Spokane, one claim; Harry Eckman, Spokane, four claims; Earl J., Fred and R. N. Adkins, Klamath Falls, Oregon, two claims.

St. Joe Lead Considers New Shaft in Missouri

The possibility of a profitable lead ore body at 1,000 feet, as indicated in recent drillings, has led the Mine La Motte Corporation to consider sinking a 1,000-foot shaft in the Mine La Motte area near Fredericktown, Missouri. Mine La Motte Corporation is jointly owned by St. Joseph Lead Company and National Lead Company, but is under the general management of St. Joseph Lead.

Company engineers and geologists believe that quantity and quality will be practical at this level. It would make this the deepest lead mine in Missouri and considerably deeper than lead and zinc mines in the Tri-State district of Missouri, Kansas, and Oklahoma.

F. F. Redfield, Mine La Motte superintendent for St. Joseph Lead, reports that the deep shaft is in the planning stages, and Fred Kleppsattel, business manager for St. Joe, confirms that continued drilling will determine definitely whether the deep shaft will be sunk but drilling up to now indicate that it will be practical and profitable.

St. Joseph has one other deep shaft—950 feet at Indian Creek, near Potosi. Other shafts at Mine La Motte are 300 and 400 feet deep.

American Zinc, Lead and Smelting Company reports that its *Young* mine at South Friends Station, Tennessee, is producing about 500 tons of ore daily. This is gradually being increased so that by the end of the first quarter of this year the mine will be on a full single shift production of from 1,000 to 1,250 tons a day. At the firm's *Nellie B* properties in the Tri-State District the deposits are being rapidly depleted. Production is expected to be discontinued by the last half of 1956. The *Piquette* mine in Wisconsin, operated as a joint venture, is now functioning at near capacity and the margin of operating profit is at a satisfactory level. The mill at Vinegar Hill recently acquired from *Vinegar Hill Zinc Company* is presently being operated on a basis of approximately 500 tons of ore a day, 60 percent of which comes from American Zinc's own mines.

Lithium Corporation of America, Inc. will expand its electrolytic plant at St. Louis Park, Minneapolis, Minnesota to help meet the increasing demand for lithium metal and lithium hydride. H. W. Rogers, president of the corporation, announces that the company's present contractual requirements in 1956 make it necessary to expand the Metal Division immediately.

A uranium deposit, reportedly of "commercial quantity," has been located near Cherryvale, Kansas by Gene Cagle, Floyd Stuber, and L. L. Montgomery of Wichita. They have leased 4,000 acres in the area and expect to begin core drilling. C. L. and E. E. Oliphant of the *Wichita Uranium and Assay Equipment Company* have checked the deposit for the group. Cherryvale is 50 miles east of the old Webb City-Carterville lead and zinc mining district in Missouri.

Carter Buton of Independence, Kansas has filed 21 leases on 3,190 acres of western Montgomery County, Kansas land claiming he has indications of uranium "hot spots." Explorations are now going on in the Elk City and Havan areas. Associated with Mr. Buton in this prospecting are M. J. Blum, Melvin Hammer, V. O. Wells, and K. E. Tague, of Wichita, and Leroy Davidson and Henry A. Wille of Kansas City, Kansas.

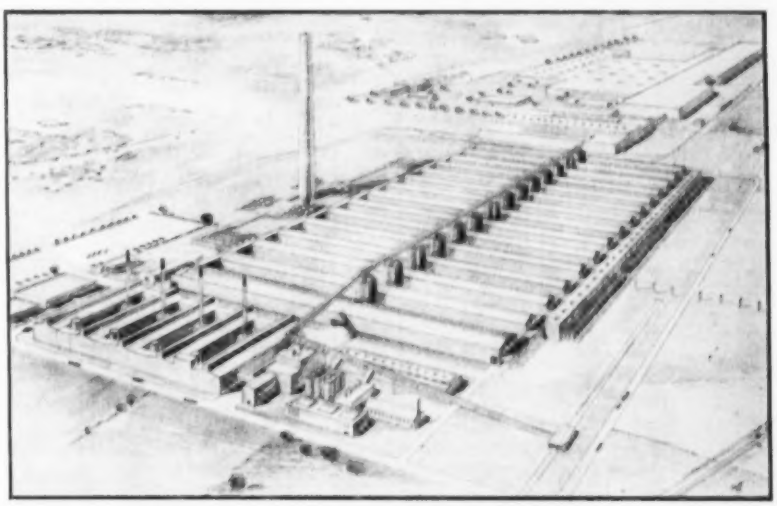
Mexico Refractories Company is installing a rotary kiln at the east end of its property at Mexico, Missouri for continuous process preparation of calcined materials. The firm recently celebrated its 25th year of operation.

The *M. A. Hanna Company* has established a mineral technology scholarship at the University of Minnesota or its Duluth branch. The scholarship is available to students pursuing courses in mineral technology or in mechanical, electrical, or civil engineering. Preference will be given to students seeking degrees in mining metallurgical, or geological engineering, however. The scholarship is for $500 for each year of the regular four-year course, provided the student continues to merit it. A new scholarship will be awarded each year as long as the program is continued by the company. For additional information, contact the M. A. Hann Company at Hibbing, or the University of Minnesota.

Snyder Mining Company plans some stripping work at the *Webb* and *Whiteside* open-pit iron ore mines on the Mesabi Range during the winter season. Both mines were producing during the past season.

Major changes are being made in many of the plants of *Oliver Iron Mining Division, U.S. Steel Corporation,* and *Pickands Mather & Co.* this winter. Effective next season, these companies must ship minus-¼-inch fines separate from the coarser ore. This means the installation of a good deal of additional screening, conveying, and storage equipment. Shipping fines separately will enable the companies to send them directly to sintering furnaces without screening again at Lower Lake ports.

Reserve Mining Company has now started operation of the first sections of its new taconite concentrator at Silver Bay, Minnesota. The first concentrator section went into production during the week of October 10, with a second section starting up shortly afterward. Pellet production started during the week of



$280,000,000 Expansion for Kaiser Aluminum

Kaiser Aluminum & Chemical Corporation has announced a $280,000,000 expansion program that will bring the company's total primary aluminum capacity up to 654,000 tons (1,308,000,000 pounds) per year. This will increase Kaiser Aluminum's basic capacity by more than 50 percent and establish the company as the nation's second largest aluminum producer, says D. A. Rhoades, vice president and general manager. Major projects under the new program will be construction of a 220,000-ton aluminum reduction plant at Ravenswood, West Virginia, at a cost of $120,000,000, and a 500,000-ton alumina plant on the Mississippi River near Gramercy, Louisiana, to cost $60,000,000. Ground breaking should begin in April with first of seven potlines at the Ravenswood plant to start in July 1957. Other lines are scheduled to start at intervals of from 2½ to 3 months as each is completed. The artist's sketch above shows the Ravenswood reduction plant; in the background is the new $96,000,000 sheet and foil rolling mill now under construction. The alumina plant at Gramercy will operate on Caribbean bauxite from the firm's mines on Jamaica, British West Indies, brought in by ocean-going ships directly to the new plant site.

CENTRAL AND EASTERN

October 20. The first shipments will be made by lake with the start of the loading season in the spring.

Primary aluminum producers predict that United States aluminum consumption by 1960 will be about 6,000,000,000 pounds annually, with enough metal available if planned expansions are carried out. Recent announced expansion plans include those of *Harvey Machine Company*, *Olin Mathieson Corporation*, and *St. Joseph Lead Company*.

E. I. duPont de Nemours & Company has returned to the Office of Defense Mobilization a Certificate of Necessity for the now canceled titanium plant which was to have been built near Johnsville, Tennessee at a cost of $40,000,000. DuPont will build a plant to make commercial products at the site. ODM has suspended further encouragement for titanium sponge facilities.

Synthetic Mica Corporation, a subsidiary of *Mycalex Corporation of America*, has opened what is considered to be the first plant in the world designed solely for the production of synthetic mica. The formal opening of the plant in Caldwell Township, New Jersey, marks the successful conclusion of a 10-year research effort to produce mica synthetically. The synthetic is made from raw materials plentiful in this country, and is intended to reduce U. S. dependence upon foreign sources for this material.

Vanadium Corporation of America will build a modern plant for production of ferroalloys in Jefferson County, Ohio where the company has taken options on sites covering approximately 350 acres. Operations are scheduled to begin in the latter part of 1956. The plant will be the third largest for the company. Although designed primarily for production of ferrochromium alloys, its electric furnace facilities will also permit production of various other ferroalloys used in the steel and aluminum industries.

Branch Lawson has purchased the *United Feldspar Corporation* plant site at Minpro, North Carolina, together with all company mines. United Feldspar succeeded *Tennessee Mineral Corporation* which built the first feldspar plant in the district about 1923. This plant, expanded until it was one of the largest in the district, burned down six years ago. Part of the purchase includes the alaskite properties, as well as the feldspar. Mr. Lawson reportedly plans to organize the *Lawson Feldspar & Minerals Company*.

Frank M. Lottridge, president of *New Era Corporation*, reports that his firm has leased 15,000 acres of land in Ohio containing uranium-bearing ore. The ore is low in grade but extensive, according to Mr. Lottridge. The firm has opened an office at Waverly.

Cerro de Pasco Corporation, whose principal mining operations are in Peru, has purchased the assets of the *Circle Wire and Cable Corporation* of Maspeth, Long Island, New York, in a major step toward broad diversification.

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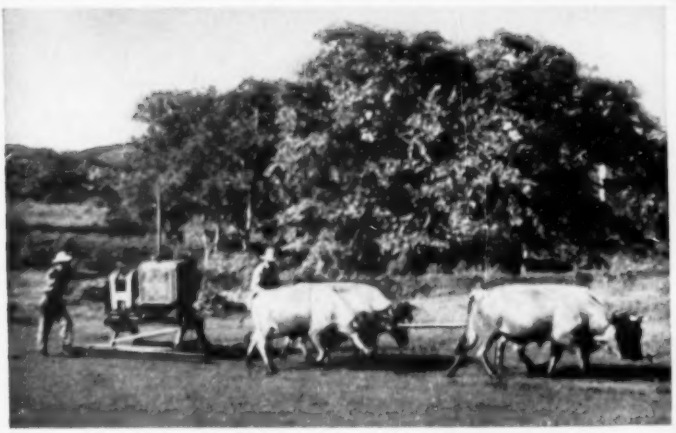

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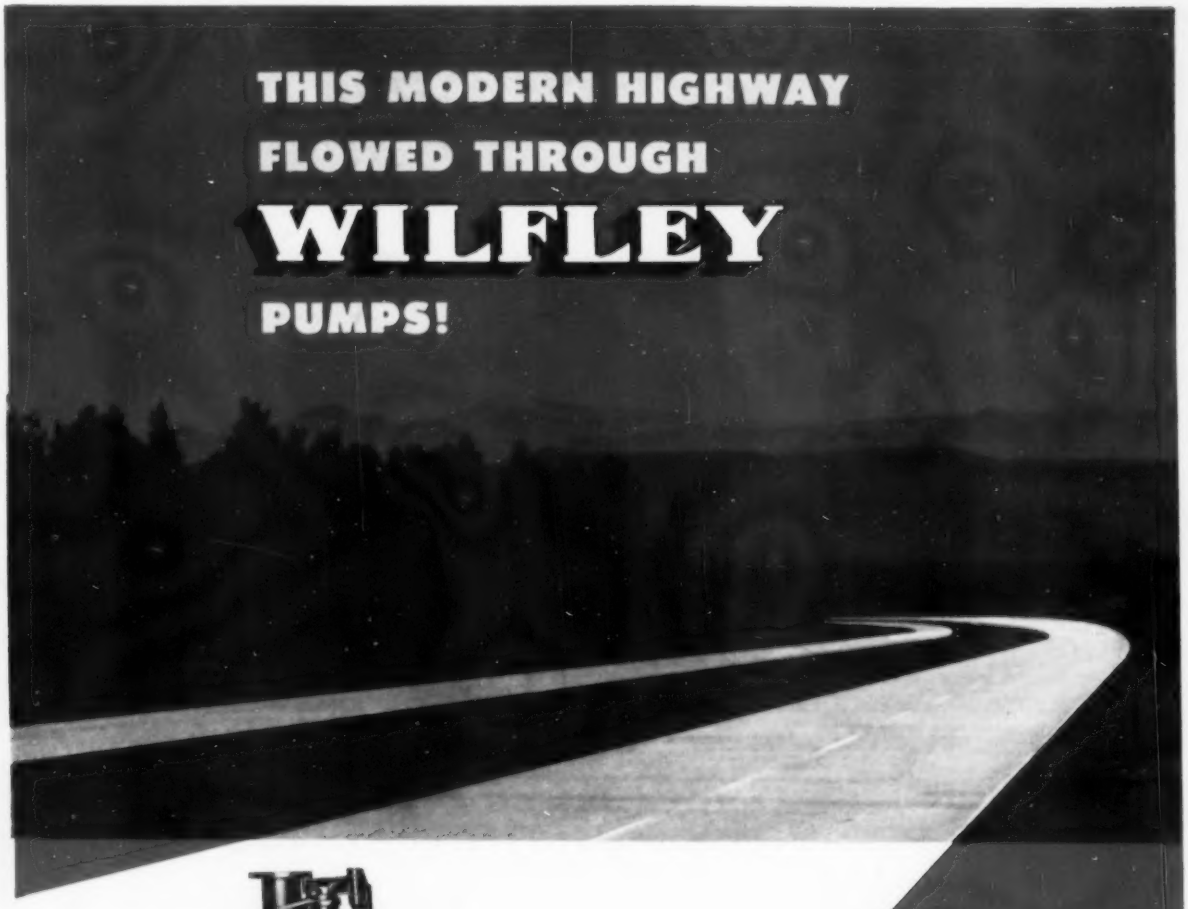

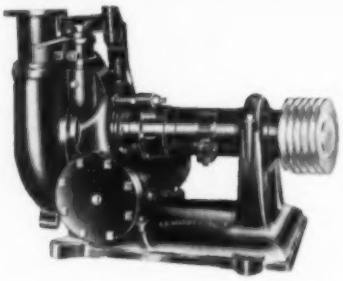

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